

Proceedings of a Symposium January 28-31, 1979 Tucson, Arizona



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College of Agriculture
University of Arizona
and Private Organizations and Citizens' Groups

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FOREWORD

The Symposium on Rangeland Policies for the Future was designed to provide interested publics with a better understanding of the role and future opportunities for livestock grazing on public lands as well as to provide a forum for discussing public and private land grazing concerns. The Symposium focused on identifying the existing resource base and examined competing interests for the allocation and management of this resource, including use by livestock, wildlife, wild horses and burros, and recreationists.

The economic consequences to rangeland use and management of vegetation manipulation, desertification, financial incentives, socioeconomic constraints, institutional concerns, and research needs were examined and discussed. Environmental considerations were discussed in light of economic pressures on rangelands.

The Symposium sprang from concerns of many people over the condition of public rangelands and the interactions of livestock use on these lands with other uses—principally wildlife. However, as planning discussions began, it soon became apparent that for a range symposium to be fully useful, it should consider range problems and opportunities on all of the more than 800 million acres of rangeland in all ownerships.

Those thinking this way have been proven fully correct. For the Symposium very soon and clearly revealed that public rangeland problems are not fundamentally different from private rangeland problems. Management needs and problems of rangeland are basically the same whether the land is public or private. And equally important, the Symposium revealed the complementarity between these lands. The Symposium also reinforced the belief that America's public is concerned about how rangelands are used, their present condition and productivity, and the opportunities these lands provide for meeting society's future natural resource requirements.

Through the Symposium, people of many backgrounds and interests were given an opportunity to listen, and to be heard. These proceedings bring together papers presented during the 2-1/2 days, except for several that were not available to the editors. Also presented are statements submitted by attendees and responses to questions submitted at the Symposium. Dialogue during discussion sessions at the conclusion of each panel session is not included.

ROBERT S. RUMMELL, Chairman
Interagency Committee on the
Sense of the Symposium, and
Assistant Director, Range Management
U.S. Department of Agriculture
Forest Service

OVERVIEW FRAMEWORK OF RANGE MANAGEMENT

COMMITMENT TO THE FUTURE

By

M. Rupert Cutler
Assistant Secretary of Agriculture
for
Conservation, Research, and Education

There's a new mood abroad in the land. It appears obvious that our citizens are becoming more aware than ever before of rising resource costs, of probable resource scarcities, and of the value and potential productivity of our natural resources. Indications are that they strongly support efforts to manage and protect those resources so as to maintain productivity and enhance environmental quality.

This mood is reflected in several laws and policy decisions adopted during this decade, including the National Environmental Policy Act, the Federal Water Pollution Control Act, the Forest and Rangeland Renewable Resources Planning Act and its younger sibling, the Soil and Water Resources Conservation Act, the National Forest Management Act, the Federal Land Policy and Management Act, and the Public Rangelands Improvement Act.

The key message sent by all this Congressional action is: we must be good stewards of the land; we must wisely manage our resources, plan and program their uses, and maintain or increase their productivity and value for future generations.

In recent months, I have asked USDA's conservation, research, and extension agencies to direct special attention to the wilderness and wildlife resources on lands they administer, and on lands they influence the management of, through technical and financial assistance. One resource to which we in the USDA may not have devoted enough attention in the recent past, however, is the range resource. That imbalance, where it exists, will be corrected.

Our conscious effort to address rangeland conservation and management needs on a high-priority basis begins here, today.

Earlier this month, the Department of Agriculture's Forest Service completed RARE II, a comprehensive review and evaluation of 62 million acres of roadless areas in the National Forests and National Grasslands, designed to allocate some 3,000 separately identified

Fifteen million National Forest acres are being recommended to Congress for wilderness designation. Many of these proposed new wildernesses are contiguous to and coordinated with the Interior Department's park, refuge, and potential public domain wilderness proposals. Some 36 million acres will be opened for uses not allowed under the wilderness designation. And further planning is recommended on 11 million acres. Their "best" use will be addressed in National Forest land use plans to be finished by 1985, and additional wilderness proposals will come from this process.

RARE II illustrates our interest at the Department of Agriculture in making prompt decisions on public land allocations and then getting on with high-quality multiple-use land management. Wilderness is one form of multiple-use management—one of the uses stipulated in the Multiple Use-Sustained Yield Act of 1960. Wilderness-designation is a logical first step in comprehensive land-use planning. But, we are equally interested, I assure you, in stepping up our pursuit of appropriate resource development on public lands, and research, informal education, technical assistance, and financial assistance to help private landowners make their own sound land-use decisions.

Just as we've spotlighted wilderness and land use in RARE II, we've emphasized the importance of our fish and wildlife resources.

Last March, in Phoenix, I announced at the North American Wildlife and Natural Resources Conference that a primary goal of the Department of Agriculture in the Carter administration will be to ensure that wildlife achieves truly co-equal status with other land resources in our planning processes, management decisions, and technical assistance programs. I committed the USDA to a greater emphasis on wildlife management objectives, to improved interagency cooperation—especially with the State wildlife agencies—and to new policy directions, such as minimizing stream channel modifica-

ground, in enhancing our wildlife and resource.

It's high time we take the same special approach to the Nation's rangeland resource—that we in the USDA give range management equal billing with our other renewable resource programs through giving it the additional emphasis it needs and deserves.

Range ecosystems, in my opinion, have too long been treated as stepchildren by Federal—at least USDA—resource agencies. For some reason, they seem to have been benignly neglected, a resource considered relatively insignificant compared to the rich productivity of crop lands and forest lands.

Not that the Department of Agriculture hasn't been hard at work on range management issues and opportunities for a long time.

The USDA has been a leader in advancing professionalism in range management. USDA employees with university degrees in range management—in FS, SCS, ASCS, old ARS, old AAA, ES, etc.—led establishment of the Society for Range Management in 1947. And these Agencies, I'm told, have employed the bulk of all range professionals:

- SCS has more than 250 range conservationists. That population is solid, if too small for the range job.
- SEA employs range conservationists in research.
- FS has more than 250 range conservationists, and another 700 with university majors in range management, both in management and research.

And, USDA range conservationists and managers have led in establishing ecological classification systems, and in the use of ecological principles in systems approaches to land use planning.

But, I suggested that this symposium be held, and I am here at this symposium because I believe it's high time we developed even further the value and tapped the potential productivity of the rangeland resource, whether Federal, State, or privately owned.

And we are here to listen to your suggestions regarding the policies, programs, and practices needed to achieve this objective while protecting this important resource from abuse and exploitation.

What is this "rangeland" we're talking about?

In our discussions here, we will be thinking and talking about the needs, policies, programs, and practices for a forest and rangeland resource which encompasses 1.56 billion acres—69 percent of the land in the United States—a land area roughly equivalent to everything in this country west of Louisville, Kentucky, excepting Alaska and Hawaii.

This is a resource which is 46 percent federally owned—but more than half is non-Federal, and therefore really beyond the purview of Federal land managers. Non-Federal rangelands are more in the ballpark of our extension agents and our soil conservationists, who can provide technical and economic assistance to encourage the adoption of good conservation practices. It is important that the Federal Government's range management practices on Federal land and its range management programs for private landowners be compatible and closely coordinated through an appropriate Federal organizational structure.

Our rangeland resource is distributed throughout the Nation, but it's concentrated in the West. Our neigh-

boring opportunities and problems that we are addressing here. Our rangeland resource is a diverse and complex array of sometimes fragile ecosystems.

And it is a resource upon which we are becoming increasingly dependent for a variety of uses—traditional uses such as rangeland grazing, as well as new values which we have determined our rangelands can provide.

This is a resource which provided 217 million animal unit months of livestock grazing in 1976—188 million from non-Federal lands, 29 million from Federal rangelands—and which provided 15 percent of the total roughage used by livestock in this country.

And these rangelands are a resource in which we are continuing to find new values—nongrazing uses—which are becoming an increasingly significant part of their total worth to society.

Commercial or potentially commercial rangeland crops include oil from jojoba . . . rubber from guayule . . . juniper for firewood, as oil and gas prices climb. These rangelands are hunted on and frequented by recreationists, and mined for the coal and minerals which lie beneath them. They provide needed habitat for many species of wildlife—some threatened or endangered, like the bald eagle in Salt and Verde River valleys. And one-fourth of the surface water runoff in the West comes from rangeland ecosystems.

These rangelands are a source of life, livelihood, and enjoyment to millions of Americans—30 million people live within or immediately adjacent to them. They bear a very great potential for effective and enduring returns from multiple-use management. Yet, in our neglect, we have permitted them to produce at far less than their potential.

Fifty-four percent of the rangelands in the "lower 48" States—some 350 million acres of private, State, and Federal rangelands—are in poor or very poor condition, with vegetation and soil conditions estimated to be at or less than 40 percent of their potential. This is a sad state of affairs. And this is accompanied by encroachment of brushy plants with little or no economic value, and by significant erosion of soil from the arid and semiarid rangelands of the Southwest, with related effects on sedimentation of streams, degraded wildlife habitat, and impaired recreation values. Of the 50 million acres of National Forest System rangeland, 16 million acres are in poor shape today.

As a Nation, we once deeply felt the far-reaching effects when a large resource was ignored, abused, and permitted to waste away. Since the Dust Bowl days on our croplands and rangelands, we have spent several generations correcting the abuses of the past. On private and public lands alike, we have tied down the soil, brought water to once-dry lands, and recovered the productivity of millions of acres of once-lost land. With revolutionary advances in conservation practices based on USDA and State agricultural experiment station research, and with excellent cooperation among government, science, industry, and rangeland owners and users, we have turned the corner on the degradation of our rangelands.

Now it's time to go the extra but essential step—to shape a commitment to the future of the rangeland resource, to speed our efforts to build back the fertility and productivity of these lands for all uses, so they can contribute in more effective ways toward meeting our future needs.

We can foresee continued growth in the pressures which already are bearing on rangeland ecosystems—a demand for rangeland grazing nearly twice the available supply; growing needs for energy, for food, and for other materials which lie on or under rangelands; and a burgeoning need for recreational and esthetic opportunities.

We can accommodate these pressures, but we must do it through the application of additional knowledge, through thoughtful, long-range planning, and through our mutual commitment to solving the problems, resolving the conflicts, and taking the initiatives involved in the effort.

In our programs, in our investments, we will continue to address the need for conservation leadership. President Carter's environmental program has expressed the challenges ahead of us. From wildlife to wetlands, rivers to rangelands, cities to forests, it points the way to what must be done. The Department of Agriculture will accommodate expanded resource use but only within the limits set by good land stewardship. We will cooperate with other nations, with landowners, with the general public, with our colleagues in Interior's Bureau of Land Management, and with other agencies at all levels of government to make our rangeland healthy and productive. We will advocate wise land use. And we will apply our Forest Service and Science and Education Administration's research resources and that of university cooperators to solving the problems we encounter.

In planning our programs to meet the future needs of our Nation, we will weigh the opportunities to meet those needs from private and other public lands, as well as from the lands the Forest Service administers directly. This is the intent of the Forest and Rangeland Renewable Resources Planning Act and the Soil and Water Resources Conservation Act, which require that the USDA assess resource availability and condition on all ownerships, public and private, and program to help tap all ownership resources to meet the needs of the Nation. In an era of tightening budgets and growing needs, we must seek to be responsive to those needs in the most cost-effective manner.

We have long conducted range research in the USDA, but now we must strengthen research programs to improve our ability to accommodate a blend of rangeland uses. The Department of Agriculture's range management research effort—in the Forest Service and the Science and Education Administration's agriculture research unit—already has turned to the ecosystem approach to improve our understanding of the interrelationships among resource uses. We have reprogrammed research to explore the interactions of forage production and livestock grazing with wildlife habitat, watershed values, recreational opportunity, and timber supply, to help us determine the scope and extent of

One example of USDA's trail-blazing range research programs is that conducted at the Southwest Rangeland Watershed Research Center, where our scientists compile data from watersheds in Arizona and New Mexico to study the quality and quantity of water from southwestern rangelands. Information obtained is used to determine present and future water resource potentials, including managing the use of the water for competing local and downstream users. Studies on the Santa Rita range near Tucson and the 58-square-mile Walnut Gulch watershed near Tombstone are part of a comprehensive plan to maintain agricultural production on rangelands at a cost ranchers can afford while maintaining environmental goals that ensure both availability and wise use of future rangeland resources.

There are areas we still need to explore. We need to determine the critical habitat requirements for endangered plant and animal species and the management strategies needed to protect that habitat. We need a multiresource identification and classification system that is acceptable to all land management agencies. We need to understand better both the structure and function of rangeland ecosystems, as well as our data needs, to help us better predict the environmental impacts of our proposed actions. We need new germplasm and improved varieties of grasses, forbs, shrubs, and nitrogen-fixing plants which are easier to establish and more tolerant of pests and grazing. Some of these may come from the USSR, represented here today by Dr. Gaava of the Russian Embassy in Washington. Some of these may come from China, as the doors open for cooperation with that now-friendly nation with so much rangeland. We need to determine the potential for improved production on better rangeland sites. And we need to understand the relationship between grazing intensity, soil erosion, water quality, and fish and wildlife populations on those sites. We will look to our researchers to help us find the answers we need.

We will look at the opportunities to invest, now, in the cooperative extension, technical assistance and higher education programs which are so essential in the long run to improved rangeland productivity. Passage last year of the Renewable Resources Extension Act and our recent success in recruiting Merrill "Pete" Petoskey of Michigan's Department of Natural Resources to head our new Federal Extension Natural Resources Program Staff beginning March 11, provide important momentum toward this end. Merrill L. (Pete) Petoskey is here, and I'd like to introduce you to him. Pete, would you please stand up so that folks will know who you are! We will consider the immense need—the great opportunities—to educate the general public in making better use of rangeland ecosystems without abusing them. We can ill afford to ignore the enduring benefits of these programs.

In our policies and programs, we will seek optimum use of our resources, blending uses where possible, permitting them to coexist where they are compatible, and restricting or moderating them where necessary to accommodate other uses or protect the land.

achieve many of our needs. But good wilderness management requires cooperation among all rangeland users.

Where there are conflicts among uses, we will use reasoned negotiation to resolve them, rather than draw arbitrary lines between alternative land uses. Wherever possible, we will negotiate the means for accommodating concurrent land uses, modifying or limiting individual uses where necessary for a broader benefit.

We will continue to permit livestock grazing and rangeland improvements in National Forest wilderness areas, for example, where grazing was established before the wilderness was designated and where the improvements will help protect the resource and are compatible with wilderness use. I believe this policy is acceptable to most wilderness users—in some circumstances, the presence of livestock may even add to the wilderness experience.

We will not hesitate, however, to restrict or modify public rangeland uses where it is necessary to protect the land, to accommodate a fair balance of other uses, or to improve the long-term condition or productivity of the site.

Good land stewardship will be the bottom line for our uses of the land. We will not accept long-term losses to maximize short-term gains. Nor will we permit uses on sites where they will cause long-term damage to the soils and vegetation on our rangelands.

We are very familiar, for example, with the long-term damage to rangelands which can result from indiscriminate use of off-road vehicles. They have ruined fragile soils, harassed wildlife, and damaged unique archaeological sites. I shall review the implementation of our off-road vehicle policy to determine if our Forest Service plans truly are in full compliance with President Carter's off-road-vehicle directive, expressed as part of his environmental message.

I also am becoming concerned about potential long-term effects if we begin to commercially cultivate guayule, jojoba, and other plants on arid or semi-arid rangelands. Certainly, we are interested in the use of these plants as native sources of materials we now import. As vice-chairman of the Native Latex Utilization Commission, a cooperative program involving the USDA, the Department of Commerce, Interior's Bureau of Indian Affairs, and the National Science Foundation, I shall encourage exploration of the economic potential of guayule as a natural, domestic, commercial source of rubber.

Though we are delighted that these plants may help us meet some of our national material needs, we also know that these semiarid rangelands are fragile environments. We may find that the environmental risks involved in the intensive cultivation of these plants on the rangelands outweigh their commercial value. Our USDA research programs and the work of the Commission will help us resolve that question.

Increasing the productivity of our rangeland ecosystems will require close cooperation among the various agencies, operators, and private landowners who

the Interior received significant new authority and direction in rangeland management from the 94th and 95th Congresses. The Federal Land Policy and Management Act and the Public Rangelands Improvement Act give both the Department of the Interior and the Department of Agriculture significant new guidance and authority in range management. Our interdepartmental working relationship will be the better for it, and so will the rangelands.

This is particularly the case in the West, where our lands are intermingled with State-owned and private lands in an intricate and rich tapestry of uses and ownerships, and where the policies and practices applied on one parcel may greatly influence the productivity, use, and management of neighboring parcels.

Particularly for rangeland grazing, there is a traditional, seasonal symbiosis between public and private rangelands which allows the livestock operator to follow the natural production capacity of the land, thereby gaining more efficient use of grazing resources than if production were confined to one ownership.

We recognize the crucially important relationship between Federal rangelands and the vitality of the livestock industry in the West—and the subsequent impact of Federal range policies on that industry, on the farms and ranches which comprise it, and on the stability of rural communities. We empathize particularly with the small rancher—the small permittee—whose operation may be economically marginal.

The Federal Government has a responsibility, I believe, to recognize the effect it may have on those operations, and to realize it is working not only with the management and use of a resource, but with the sustenance and continued vitality of a way of life as well. Cost-sharing and other financial assistance should be made available to those whose profit margins do not permit the long-term investment in rangeland improvements.

The Department of Agriculture will be an advocate, as it should be, of wise land use. Secretary Bob Bergland recently signed a new land use policy to address that role. This policy speaks to the need for growth and development, to the protection of natural ecosystems, and to the need for adequate supplies of food, fiber, and water. And it firmly establishes our role as an advocate to prevent the conversion of important farmlands and forest lands, prime rangelands, and wetlands to other uses. We will be working with the States and with local governments to help identify those lands, and we will be speaking out to encourage action to retain those lands in production.

USDA has worked closely with the private owners of 54 percent of the Nation's rangelands. Our research continues to provide the basis for more efficient, productive, and environmentally sound range management practices and has broadened the variety of products and uses we can get from our rangelands.

Our extension and technical assistance programs have helped private rangeland owners, livestock operators, and other rangeland users expand their productivity,

increase the efficiency of their operations, and improve the margin of their profitability.

Since 1965, we have formally coordinated our technical assistance efforts with those of the Bureau of Land Management, to provide many of the individual livestock operators who use both private and public lands with single, coordinated, resource plans for their entire operation. These coordinated resource planning efforts have been endorsed by the National Association of Conservation Districts. Where there is a significant intermingling of lands in public and private ownership, coordinated resource planning should be the rule among the Federal agencies involved in such areas, and this degree of on-the-ground cooperation should be extended to the States and other organizations as well.

Since the 1977 United Nations Conference on Desertification, we have been developing an antidesertification program with Mexico which will be a cooperative effort of our two Nations to generally enhance the productivity of our arid and semiarid lands.

We have met twice—once here in Tucson and last month in Saltillo, Mexico—to work out the details of our cooperative effort, and we hope to formalize the bilateral program shortly. We have agreed to give priority to our cooperative efforts in soil and water conservation in these arid and semiarid ecosystems, with an eye to increasing food production and preserving the ecological balance, and to expanded research and technical assistance programs with a view to the conservation, regeneration, and commercial culture and use of native plant species such as guayule and jojoba.

We share a common rangeland resource with Mexico, and I'm pleased we can develop this cooperation

through addressing some of our common problems and common opportunities. I hope we can enlarge this cooperation still further in the future, by convening a regional meeting for the Americas to address the problem of desertification on our continents.

I have set out here much of the philosophy, many of the goals, and several of the statutory authorities which guide and drive our rangeland programs in the U.S. Department of Agriculture. We have recognized the great worth, the many needs, and the tremendous potential of our rangeland ecosystems.

But how do we approach the problems of these ecosystems, fully restore their productivity, and tap their potential without degrading their quality? How do we put them to work, meeting the pressing needs of the Nation, without destroying them? What policies, programs, and practices are necessary? We must have a well-grounded humility in realizing how little we truly know about what must be done.

That is why we have invited you to this symposium—to gain your help in gauging the needs of our rangeland ecosystems, to help us look for solutions to some of the problems we discover, to help us determine which problems to approach first, and to enhance the cooperation with which we must approach these problems.

We should recognize the very long-term nature of our venture. A quick fix is not possible. We may have to be satisfied, rather, with a gradual improvement in rangeland productivity and condition.

Let us begin, now, with a commitment to the future worth of these rangeland ecosystems.

We are asking you to help us shape that commitment.

ISSUES AFFECTING RANGELAND

Opportunities and Problems

Legal Framework

Planning Requirements

EIS Needs

Multiple Use

By

Guy R. Martin
Assistant Secretary of the Interior

It is a great personal privilege for me to be able to take part in this important meeting of people who know and care about this nation's rangelands. I intend to use the opportunity to convey, in the best sense I can, the issues which most affect the future of the American range, the policy and spirit with which the Department of the Interior is approaching these issues, and some ideas about how important this symposium, and what grows out of it, can be.

As always, in a gathering of this sort, I am humbled by the knowledge that the audience includes dozens of individuals who possess credentials far superior to mine as scientists, resource managers, or perhaps more significant, as individuals who have for many years cared about the range and addressed many of the same problems we will talk about for the next three days. I come here with the full expectation that I will benefit greatly from your advice at a time when it is most urgently needed. As a personal matter, I have always been guided by an ancient warning to "Beware, for that which you are given to administer, you presently come to believe you own."

Regarding the public rangelands, we are all the owners, and to be blunt, our record of management, considered as a whole, is not good. The history of public range management, again considered as a whole, is written largely in terms of inadequate commitment, poor leadership and adversarial relationships among the many interests who use and depend on the range. The result was, for decades, a steady and well-documented deterioration of this most basic natural resource, with the penalty being paid not only by individual ranchers, wildlife communities or small towns, but by a gradual and alarming change in the basic fabric of life in the Western United States.

There are, of course, many good leaders, many interests who have worked together, and hundreds of success stories where, in some localities, the general pattern is

the importance and potential of the rangeland resource has continued to handicap efforts to make a major and comprehensive government commitment to range improvement.

This pattern has continued, I should say, until the past few years. But now a series of actions, beginning in Congress, has provided us with a unique—and possibly final—opportunity to reverse not only the deterioration of the American range, but the attitudes which have fed the problem for several decades.

The Federal Land Policy and Management Act (or FLPMA) was a historic step in 1976. The Public Rangelands Improvement Act (PRIA) of 1978 is the most recent in a series of Congressional actions which speak profoundly and specifically to the future of public range management.

They come, of course, in the context of many other important laws, such as NEPA, the Clean Air and Water Acts, and the Forest Management and Resources Planning Act. But FLPMA & PRIA speak in terms which are particularly meaningful for rangelands, which have been so low on every resource agenda for so long that the neglect is almost traditional.

FLPMA, of course, represents a major Federal commitment to multiple use management, with competing but legitimate uses measured and decided in a system relying predominately on open public participation and sound planning. In short, FLPMA creates a system within which it is possible, but not guaranteed, that diverse range users will recognize that a common commitment to a flourishing range is more likely to serve their own self-interests, than is the single-minded pursuit of range domination by one group or another. Interests which have been at one another's throat for years, to the detriment of the range or any chance at better management, have in FLPMA a structure which will embrace a willingness to work together, in the common interest of the rangeland resource.

years. It deals with issues of range stewardship, wild horses, resource data, and other difficult issues in a manner which greatly improves our chances to bring diverse interests together to turn a bleak range history around. This is a singular opportunity, one that questions our mutual willingness and ability to take advantage of it.

Recent history causes me to be optimistic about the outcome. Congressional action on the Rangeland Improvement Act was significantly not the product of public outcry, as was the situation when legislation was passed to deal with strip-mining or clearcutting. Rather, it was the result of diverse user-group interest combined with Administration involvement and support for the bill. The fact is, that while much of the public attention focused on very real differences on the grazing fee issue, most other issues were being resolved in an atmosphere of cooperation among the key interests. Now, whatever the differences, the fee issue is behind us and the emphasis is on carrying out the law together.

There are other reasons, as well, to believe that there is a willingness for old adversaries to work together now. One is a growing recognition of the severity of the problem itself, and the sense of deterioration not only of the range but the lifestyle it supports. There is also a recognition of new, non-traditional competitors for use of the range resources, such as energy developers and land speculators. The simple realization that these strong and well-endowed competitors may assert virtually undeniable single-use demands if the multiple use system breaks down, is the best incentive there can be for the traditional range-user to throw in with a public management system actively seeking the best combination of uses to sustain and enhance the overall rangeland resource.

I can't adequately characterize the attitude of ranchers, or environmental organizations, or other key groups as we undertake this challenge, but I can tell you about my attitude and something about the Bureau of Land Management and the Department.

I proceed from the fundamental assumption that the American rangelands are a national resource which must sustain a broad and diverse set of interests including farm and ranch operations, communities, transportation, wildlife, wilderness, watershed and too many others to name. They must sustain these interests, these uses, in a balanced manner which guarantees that the basic resource (all of it) is renewed and enhanced. Within this context, I believe the preservation and enhancement of agricultural and livestock uses on the public range to be inherently valuable in the long-term effort to save the nature and quality of the basic range resources.

These views, along with a recognition of range deterioration, and the failure of us all to get the problems recognized over past years, led me to make the Department's range programs one of my highest personal priorities when I took this position nearly two years ago. I was working fertile ground, as it turned out, because the Secretary enthusiastically supported truly new initiatives each time they were advanced. A short

- In the first BLM budget I advanced (for FY 78), I advocated an increase in all range areas which truly changed past practice. The Secretary not only supported it, but went to the President to nail it down after seeing it cut at OMB. We did the same thing the next year, but significantly, no appeal was necessary. Over the two years, over \$10 million was added in the Administration budget, reversing years of history which saw range funds lose out in the offices of the Assistant Secretary, Secretary or OMB.
- The 4-year authorization request by the Administration followed the same pattern, surpassing in its level of requested authority, both previous budgets and all expectations, if history was a guide. I am told, and you can check it, that the receipt of this proposal in Congress provided a clear incentive on this issue because it signaled a genuine and sizeable commitment to improvement of the public range.
- The Department committed itself early to not reacting against the court-ordered EIS's but rather, using them as the best possible management tools under the circumstances. Instead of dealing only with grazing, they are being increasingly used to deal with the whole spectrum of uses and management actions. And we are now firmly on a course to get them done on the court-ordered schedule. (As a side note, let me suggest that, for all the controversy about these EIS's, they were an early impetus and source for considerable upgrading and funding for gathering badly needed range data.)
- We have made meaningful changes in some of the basic systems which affect the quality of BLM range management. Single use resource inventories have been discontinued, and one process is now used to cover all uses in an inventory, saving time and money, and leading to better multiple-use decisions. Also, the aged regulations which covered grazing administration have been modernized to reflect current demands and conditions.
- We fought hard to see that the District Multiple Use Advisory Boards were spared in the overall Advisory Board cutback, and while unsuccessful, we strongly support the section in the Rangeland Act mandating them.
- Beginning early in 1977, we established and carefully maintained a schedule of regular communications on range matters with the States, the livestock industry, the environmental community, and most user groups, with which we intend to maintain and expand this pattern of communication.
- And perhaps most important, we took an active and supporting role in the development of the Roncalio bill, working closely to see that the bill was a good one which would get administration support. Notwithstanding disagreements on the fee issue, it is a bill we feel a part of and are eager to carry out.

These are all things we have done which indicate, I believe, our approach to the task ahead. We are prepared, however, to do much more.

- Within the next month we are prepared to ask you to review a draft of Rangelands Management Program. It is a comprehensive strategy which establishes the policies and objectives of the Department for Rangelands Management for the next 20 years; establishes schedules for the completion of inventory, planning, environmental statement and on-the-ground improvement work; and which describes our budget strategy for making it work.

Writing the program has helped us understand the particular problems we face, and your full participation in reviewing it will make the process even better. Although the full document is not yet ready for review, a list of the draft objectives identified thus far for the next 20 years follows:

1. Improve the vegetative condition of the rangelands and maintain them at high levels of quality, quantity, and diversity.
TARGET: Upgrade 135 million acres currently in poor or fair condition to higher classes.
2. Reduce erosion, minimize sedimentation and siltation, and ensure the stability and productivity of rangeland soils.
TARGET: Reduce erosion on 68 million acres currently in severe, critical, or moderate erosion condition and

3. Ensure that water of sufficient quantity and quality is available to provide for the needs of the basic vegetative system and all recognized uses, protect groundwater recharge, maintain in-stream flow requirements, and meet Federal and State water quality standards.
4. Minimize short-term disruption and ensure the long-term stability of the western livestock industry and the economies of many western communities through cooperative management.
5. Increase overall forage supplies for livestock, wild horses and burros, and wildlife as a principal output of improvement of the range vegetation system.
TARGET: Double the current annual forage production to 11.2 million tons per year.
6. Ensure the protection of threatened or endangered plant and animal species and their habitat.
TARGET: Protect 54 million acres of habitat for six endangered species presently identified in recovery plans until further information on habitat protection is available.
7. Provide and protect habitat for fish and wildlife to ensure natural diversity; enhance streamside, shoreline, and emergent and submergent vegetation; and provide water of a quantity and quality necessary for fish, other aquatic organisms, and wild fowl.
TARGET: Protect and enhance 155 million acres of terrestrial habitat; restore and protect 6,500 miles of streams.
8. Protect and manage flood plains and wetlands to ensure protection of people and property and to conserve riparian systems.
9. Protect areas of special natural, scenic, historical, cultural, and scientific value, as well as natural hazard areas, through judicious application of existing authorities.
10. Ensure public involvement in pursuing all of these objectives through coordination, consultation, and cooperation with Federal, State, and local government representatives and the private sector in planning, managing, and administering the Nation's rangeland resources.

There is a great deal of further work to be done on the program, of course, and we will need your help, but we are prepared to say what we intend and accept what you offer to improve it.

- We are also prepared to take seriously the new concepts and directives in legislation. The stewardship program is a good example. We have drafted a statement of principles for the Stewardship Program which has the endorsement of both the Forest Service and Senator Church, who first proposed it. Our objective is to work cooperatively with range users to find innovative and effective ways to improve range conditions to their full potential and to resolve the difficult management problem of intermingled lands. In addition, we have drafted a statement of objectives and operational procedures for the first experimental coordinating committee, in Challis, Idaho.
- We are prepared to undertake a reorganization of the BLM Washington Office intended to merge the disparate functions affecting rangelands into a single unit with a comprehensive range management charter.
- We are prepared to dramatically improve the quality of BLM's relationship to the range science community, as part of an overall effort to improve the techniques, data and policies we use. A National Academy of Sciences review of BLM programs is beginning which will focus special attention on range science through a continuing seminar series on technical and methodological issues, of which this symposium is the first.
- We are prepared to give immediate and special attention to the techniques available, both within the government and in the private sector, for mitigating the economic effects of needed management actions. We've taken some steps already to identify sources of assistance but we think much more can and should be done if we work together on the problem.
- We are also prepared to deal directly with the massive problems of interspersed range ownership by forging new working arrangements with State and private land managers, even where such arrangements mean that someone's specific management prerogatives (even our own) have to give in the name of the public good.

My hope is that these actions, more than any words or good intentions, will characterize the commitment we are bringing to the overall task of recapturing the glory of the American range. To succeed, we will have to put many past practices and attitudes aside as we create an alliance having a common interest in the basic rangelands resource.

In the short term, there is no doubt in my mind that such an alliance will require that the most constructive and tolerant elements of every involved interest must provide unprecedented levels of leadership and understanding of the long-term objectives of range recovery which have now so clearly been endorsed by Congress.

Environmental and wildlife interests must be willing to accept grazing continuation under proper circumstances even in areas of special protection. More important, they must join with other interests in supporting the appropriations and the range improvement activities clearly envisioned by Congress. If they do not, it is unlikely, in my view, that any effort to improve the range can be sustained over time, either politically or in terms of Federal investment.

In the short term, the key to support for such an alliance is probably the fundamental reaction of the livestock industry to the public rangeland management decisions which must be made over the next few years. Clearly, the Federal managers must now move to make new and basic decisions on the combination of uses which will lead to long-term recovery of the public range. We pledge to accomplish this through a system consistent with the law, professionally credible, and open to all interests. That system will, however, produce management decisions. Where deterioration of the range or poor existing conditions will continue unless restriction or modification of rangeland use is undertaken, we will make the tough calls in the long-term interests of the overall resource.

We already know for certain that in some cases this will cause readjustment and hardship in specific situations. If, as a general pattern, these situations are resolved in an atmosphere which looks at the merits of the management decision as it affects long-term range productivity, considering a balanced set of uses, then I believe that we are on the road to success.

If, however, the pattern is one which uniformly submerges the merits and the long-term objectives in a series of individual controversies over the immediate economic damage to specific operations, then I see little chance of success. The question for the livestock industry to seriously assess, and I know they are, is whether the long-term economic health of the industry, particularly in the West, is better served by a management system which continues to trade short-term, specific, and economically oriented range use decisions for continued long-term decline in range productivity or whether it is better served by a management system which, based on good science and sound professional judgment, makes the tough short-term calls which build toward an ultimate recovery of the range to substantially higher levels of productivity. Livestock industry

to believe that, more and more, the long-term philosophy is guiding this tough decision.

Obviously, we believe that both the resource and the industry, as well as all other uses, are better served by building a credible management system which can make the hard decisions now and deserve your support for them. This is, of course, the point of the symposium which gathers us here this week. The agenda covers virtually every issue which affects the quality and credibility of the system we intend to develop to improve our management of the public range. So that there is no doubt about it, let me say that we are here because we believe there is real room for improvement in the system

we propose, and that you are the people we believe can help us to make the right decisions.

Most of you know better than I the price of failure at this point. It includes continued acrimony among legitimate range users, litigation, and delay of key decisions, the loss of a balanced constituency for regular and full appropriations now authorized, less clout for renewable resource users in growing competition with energy developers or speculators. And most of all, it means the loss of a historic opportunity to put together an alliance of interests with the capability to actually make a positive difference in the condition of one of the United States' most important resources—its rangelands.

RANGELAND POLICIES FOR THE FUTURE

By

John V. Evans
Governor of Idaho

Changes in thinking about the land come slowly. As long as the land was thought of as a commodity to be sold or used up, instead of as a resource that supports human life, it was destined to be destroyed.

The fact is that everything comes from the land—our food, our houses, our energy, our water—every essential of life. It even serves our spiritual needs for recreation, knowledge, and contact with the untouched works of the Creator.

At one time, the land seemed limitless. In the face of vast horizons, extravagance could not be seen to be wasteful; but the horizons have shrunk and the natural limits of the land are increasingly apparent.

Wise management of our most basic resources is a matter of personal importance to everyone, even to the child in the city who has never seen a cow and genuinely believes that milk comes from a supermarket.

Modern urban civilization is a triumph of artificiality, but its roots still must be nourished by the land, and the quality of our lives now and in the future will depend upon how we care for what we jointly own, which is literally our homeland.

As such, we in the West, an area with vast amounts of public rangelands which have contributed greatly to our history and way of life—the social, physical, and economic environments—wish to make a new commitment to rangeland management with our people having an increased voice in saying how those resources are to be used, for what purpose, by whom, and in what manner.

Range management problems now touch all of the Western States and, in turn, the entire Nation. They involve interaction among private interests and State and Federal Government. They also involve national geographical problems. They also involve management problems for agencies concerned, i.e., the efficient, accountable operation of the Federal and State bureaucracy. And at the present, an increased responsibility for our citizens.

These issues have consequences for the Nation and for how we view our historical way of life in the Western States.

Because of these facts, more interest and concern is directed to problems and issues regarding rangeland use and management today than at any other time in our history. Although nearly one-half (47 percent) of the 48

in the 11 Western States. More importantly to these Western States, however, is the fact that over two-thirds (69 percent) of the land area is rangeland. Thus, the western economy and environmental quality are intimately tied to the rangeland resources.

Rangeland, as a supplier of forage for domestic livestock, is the principal component of a major basic western industry, i.e., livestock production on which much of the economic health of this region depends. These rangelands also provide water for culinary and irrigation use, habitat for a variety of wild species, both plant and animal, and open space for aesthetic values and outdoor recreation.

Very little land is used for grazing if it is suitable for intensive agriculture, and there is an active demand for this kind of agricultural production. Physical characteristics cause the predominance of western lands to remain as rangeland. Rough and irregular topography, limited productivity of the soils and/or limited amounts of water characteristic of semiarid environments are the principal factors causing this predominance of rangeland in the Western States.

Because of the physical conditions that existed in the Western States and land disposal legislation which did not recognize the limitations of the physical environment on the disposal techniques employed, less land transferred from public to private ownership in the Western States than in the Plains and Eastern States. Nearly one-half (47.8 percent) of the area encompassed by these states is in Federal ownership in contrast to less than 5 percent of the land area in the other 37 States. Special conditions exist in the Western States because of this concentration of Federal ownership—88 percent of all Federal land holdings in the 48 contiguous states occurs in the 11 Western States.

If we are to look at present policy realistically, it is therefore appropriate that we consider for a moment the history of this development.

Federal property first came into existence when colonial land claims were ceded to National Government. Enlargement of these Federal holdings through accession, purchase, treaty, and compromises occurred during the 19th century. The founders of the Republic established the concept that government land was held

The system of disposal employed in the United States progressed through sales, military bounties and preemptive recognition. To further stimulate settlement and development, land disposal techniques increasingly took the form of free grants of land to settlers in lots of 160-, 320-, and later 640-acre tracts.

The system of disposal for settlement and development worked well through the Eastern and Plains States as evidenced by the small Federal land holding in those States. Intensive cropland agriculture was visualized as the principal purpose for use of the land passed to private ownership. In the semiarid and arid regions of the West only limited amounts of land could be developed for this kind of agricultural activity. The only agricultural pursuit that was possible on a large percentage of the western lands was that of livestock grazing. Although livestock use of the land was not opposed, neither was it fostered by the legislation for disposal that developed.

Near the beginning of the 20th century, a concept developed that the general welfare of the country would be better served if certain kinds of lands were held in public ownership. Forest reserves were withdrawn from private entry and certain other special use areas were designated.

The goal of settlement and development remained strong, however, in the policies that developed, governing the use of the forest reserves which later became the national forests. The United States administered its reserved land not as an ordinary proprietor seeking to sell the products, i.e., timber, wood, and grazing, at the highest possible price, but offering it on liberal terms, including free use, to encourage the citizens to develop the country.

Only limited demand for uses other than livestock grazing developed for public rangelands outside the national forests until the 1960's. Even within the national forests of the West, (84 percent of total) watershed protection, timber harvest and livestock grazing were the principal activities for administration until the 1960's.

Settlement of the Federal Lands had been essentially completed by the 1930's. Following the depression of the 1930's and World War II, this country produced food, fiber and material goods at a rate unequaled anywhere in time or space. Both the abundance of natural resources and the policies pursued for their development were responsible.

The standard of living thus achieved had diminished the working time required to satisfy the basic needs of food, clothing and shelter. More of the individual's resources are thus expended in satisfying various desires and wants. Many of these desires and wants are associated with the public rangelands located primarily in the Western States. Hunting, fishing, recreation and wilderness values all come in conflict with mineral, timber, and food production.

Presently, few would oppose the concept that the renewable natural resources must not be diminished in productivity if both the needs of the present and a full range of options for future generations are to be met.

may be improved, developed and used. Various interests want all livestock removed; other interests want the resources developed to permit more livestock to safely use the resources. Severe restriction of certain recreational activities such as off-road-vehicle use is advocated by some, while others advocate fewer restrictions. Whether the public lands are to continue to provide opportunity for those seeking to make a living or be devoted primarily to provide enjoyment for those who have already secured their means of livelihood is an often raised question.

Because of this disagreement, it has appeared from time to time that the various interests are locked in unyielding conflict.

This does not have to be the case and some recent events in Idaho and Washington, DC illustrate this fact.

To understand this we must first examine two recent laws. The first is the Federal Land Policy Management Act of 1976.

This Act, for the first time, declared the retention of the public lands and their multiple-use management to be in the public interest. While this Act sets the intent of Congress, it leaves specifics of implementation to the determination of the agencies and citizens.

The second law is the Public Rangelands Improvement Act of 1978. Idaho takes special pride in this Act in that our Senior Senator, Frank Church, was the prime author and sponsor in the Senate of this landmark legislation.

Among the provisions of that law is Section 12 which provides for an experimental range stewardship program dedicated to the improvement of range resources through the cooperation and dedication of local citizens representing the various interests in the land.

We, in Idaho, were fortunate to have a group of individuals who represented the various interests enumerated in the Senate Conference Committee Report to Public Law 95-514. That group is the Idaho Rangeland Committee. The Committee is not an official part of the State or Federal Government, but rather functions as a *voluntary* association of agency, public and private representatives, chaired by a private land user.

The Committee has been active for over 10 years and has had much on the ground experience in negotiating land use decisions. Because of this, the Committee was asked if it would be willing to look at the problems in the Challis Planning Unit in Idaho with the idea that if the willingness was there, and if all interests were represented, including and emphasizing local, on the ground participation, the Committee could function as the facilitator of a local group to be designated by the Departments of Agriculture and Interior.

Not only did the Rangeland Committee respond favorably to my request, they also, in the course of one afternoon, agreed on local representation for the steering committee.

This action presents a remarkable example of the determination and initiative of individual citizens. Without the enforced legal incentive of regulations, hearings and time, the people themselves recognized the

timely need for action, and in a serious deliberative manner, acted.

The difficult work is yet to be done, for the range management decisions have yet to be made. There will be disagreements and misunderstandings. There will be frustrations, but the precedent has been set and the framework established.

The precedent, I believe, says much about our system of government. For our system to function effectively, faith must be placed in the capability of an individual impacted by a decision, to make a decision. This is not always easy, given the multitude of interests placing their demands on the public's doorstep. But, demands and complexities still do not obviate the premises upon which our Nation was founded.

We are proud of what is happening in Idaho in both the philosophy and action of rangeland resource management. We believe our example can be an example for all of the West. But that can only be so if we continually recognize that today's accomplishments will become tomorrow's challenge.

And there are also some basic conditions to policy making which we must remember, whether in range management or other areas.

Effective policy making requires the cooperation, trust and support of citizens in all levels of government and society. The steering committee representing the Challis Planning Unit could not do so without the support of the Congress, through legislation, and the agen-

cies, through their recognition of the efficiency and dignity of citizen participation. The involved public, making decisions about the management of public land, is a great accomplishment of responsibility on the part of all.

Issues seldom present themselves in clear-cut, black and white terms. We must never allow discussions of policy to degenerate into a we/they situation. There must be flexibility and respect for all viewpoints.

We must remember in managing natural resources, as one author has written, that more than managing grass or wildlife or land, we are managing people.

This management requires not only high professional expertise in the resources of the land, but also the highest and most sophisticated degree of political awareness and sensitivity.

I am confident that in working together toward common goals—the perpetuation of the resource, and the recognition of the demands which will be placed increasingly upon the land for food, fiber and shelter—that our rangeland policies for the future will fulfill our national, state, and individual interests.

The exigencies of our times demand that we do no less for our land and people. And if we really think about it, the challenge need not be that difficult, for our history and culture and dignity have always armed us with the courage to confront the future.

Such are our responsibilities in establishing rangeland policies for the future.

PANEL I

Rangeland Condition: the situation (RPA, RCA, other data), what it means (forage production, water quality, riparian vegetation, desertification, wildlife, cultural resources), current policy status (basis for updating and improving policy).

INTRODUCTION TO PANEL I

By

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Proper management of the vast rangeland resource depends upon adequate knowledge of the physical and biological characteristics of the land. While it is true that an excessive number of improperly managed herbivores can have devastating effects upon fragile range environments, effective range management based on a careful inventory of resource characteristics can result in sustained productivity of rangeland while yielding needed products for humans. Basic human needs are food, fiber, and contentment. Rangelands can and do supply those needs.

Rangeland condition, as the term is presently used, relates the current condition of the range vegetation and the underlying soil to the potential for which that particular area is capable. Range condition, which is based on an array of structural characteristics of the resource, is often confused with the immediate availability of forage—a reflection of current weather conditions.

While the concept of range condition is not new and the general idea was accepted early in the history of the development of the science of range management, considerable time elapsed before the principles were applied in managing rangelands. Over the years, the concept of range condition has been applied by different agencies utilizing slightly different strategies for determining condition classes. These differences, perhaps, have led to some variations in the results of range condition analyses. Some of these will be discussed in later presentations.

Rangeland condition is determined on the basis of certain structural characteristics of range ecosystems. For example, range condition analysis includes determining the percent composition and vigor of different kinds of plants, namely decreasers, increasers, and invader species, along with the delineation of certain soil and soil cover characteristics. In the full context the "condition" of rangelands is dictated by not only ecosystem structure, but also by the functional aspects of

detrital-saprophagic pathways. This is true even in those ecosystems exploited for grazing by man.

Further, the emphasis on range condition and analysis deals primarily with the above-ground portions of the plants and only indirectly with the below-ground vegetation. We once thought that there was approximately an equal amount of plant material above- and below-ground. Recent studies show that the preponderance of plant matter occurs below-ground. Also, the cost for below-ground primary production and maintenance are high and predominate in most natural ecosystems.

Recent research indicates that grasslands have a mechanism for responding to above-ground herbivory by increasing below-ground production. Perhaps as little as 10 to 20 percent of the total net primary production is above-ground; the remaining 80 to 90 percent is below-ground in the crown and root compartments. Heterotrophic production and respiration above-ground (which includes livestock) accounts for only a fraction of the total net energy trapped by primary producers. The largest portion of energy trapped by plants is utilized by such below-ground heterotrophes as nematodes and other microflora.

The essence of these comments is this: our discussion of rangeland condition will center primarily on the structural aspects of range ecosystems and very little on ecosystem function. If solar energy is the driving force of ecosystems, then we are talking about only a part of the factors that influence true range condition. The theory of range ecosystem management based on functional characteristics, however, is undeveloped. In the years to come we may be looking at the phenomenon of range condition from a more enlightened position, cognizant of both above- and below-ground structures, as well as understanding the impact of all graziers, above-ground as well as those below-ground, on range ecosystem condition.

The task of this symposium is to provide a forum for the discussion of these issues.

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THE AMERICAN RANGELANDS: THEIR CONDITION AND POLICY IMPLICATIONS FOR MANAGEMENT

By

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"There has been much written during the past ten years about the deterioration of the ranges. Cattlemen say that grasses are not what they used to be; and that the valuable perennial species are disappearing, and that their place is being taken by less nutritious annuals. This is true to a very marked degree in many sections of the grazing country."

This quotation could be from a recent article in the "**High Country News**," a bulletin from a conservation organization, a cattle grower's report, or from an introduction to one of the 212 environmental impact statements now being written by the Bureau of Land Management. It is a quotation written by Jared G. Smith and published in the 1895 "**Yearbook of Agriculture**."

Many people still believe today that the ranges are deteriorating. Others argue with great persuasion that the ranges not only are in the best condition that they have been in this century but are indeed improving. I have been asked to open this session of the symposium with a discussion on the condition of today's ranges and to speculate on some of the policy implications needed for management. In the few minutes allotted to me I will talk about the unique qualities and management needs of rangelands. I will look at their condition, both in the historical perspective and today. I will discuss some of the recent legislation affecting rangeland, and then outline the policy issues as I see them affecting rangeland in the future. In order to understand the kinds of policy issues that this country should develop I believe we should first take a look at rangeland—what it is and how it is useful to people.

American Rangeland

Many hold to the image of rangelands as those wide, rolling lands, covered with grass, populated by only a few people, free of fences, roads, and other signs of modern man. They romanticize about a home on the range "where the deer and the antelope play," or the home of the Marlboro man, or the Hollywood stereotype of wide open spaces. In fact, the American rangelands are made up of all kinds of land, from

Other parts are intensively managed with fertilizer, irrigation, and a level of input that sometimes equals those on cultivated lands.

In general, the American rangelands are those areas that are too wet, too dry, too rocky or too high for intensive agriculture or forestry. There are, however, some rangelands that are potential croplands. They could be put into intensive agriculture or forestry, but because of economic or other reasons they remain in native vegetation. Although America's rangelands are located primarily in the Western and Southern United States, some rangelands occur in almost every State. Some are in private ownership; others are part of the public domain.

Rangeland is a particular kind of land that is used for the production of many goods and services. There has been an unfortunate tendency in the past to evaluate rangelands on the basis of their livestock products alone. I believe this is a mistake. Rangelands provide the habitat for wildlife that serves both as a recreational source and as meat products for a hunting public. Water, amenity values, dispersed recreation opportunities and other rangeland products may be more valuable than the animal products, but because they are much more difficult to evaluate or do not generate income in money, they may not be recognized. It is important that we understand the proper definition of rangeland. The late Francis Colbert once said:

I want to emphasize in the strongest possible way that range—or rangeland or range ecosystems—is a kind of land. It is not a land use.

I must admit the word range has always been associated with livestock grazing (a specific kind of use) on uncultivated lands, and this connotation is still prevalent especially among the general public. . . . Nevertheless, rangeland comprises at least 40 percent of the total area not only in this country but in the entire world, so I believe it's time we made a serious effort to recognize range for what it is: a kind of land—a major land resource—from which there is, and can be, obtained a wide variety of products and values, of goods and services.

Historically, there have been unfortunate consequences from the failure to recognize range as a kind of land. Rangeland has often been lumped in with either

water, range, recreation, wilderness, etc. Timber, water, and recreation are all goods or services and outputs of the land. Forage and wildlife habitat are comparable outputs. However, range is the land itself. It can be used for the production of timber, forage, water, wildlife habitat, recreation, etc.

Because rangelands are usually not capable of producing crops or timber under intensive management, traditionally, grazing by domestic livestock has been their major economic use. However, they are capable and suitable for the production of many other kinds of products or activities valued by society.

The rangelands of this country are divided between public and private ownership. The private rangelands are mostly east of the 100th meridian, or in the more climatically favorable areas of the Western United States that were amenable to early settlement. These private rangelands are managed first to satisfy the needs, wants, and desires of the individual landowner. Land management decisions are based on their relationship to the value of the goods and services in the market place. Societal values are reflected in what people are willing to pay for the goods and products.

Public rangelands, however, are managed first to satisfy the requirements of society. The needs, wants, and values of the individual user of land become secondary to the societal values. Because these values are difficult to determine without direct reference to the market place, current management strategies usually involve high levels of public participation in attempts to determine what people want from the public rangelands.

Condition of American Rangelands

While I believe that the American rangelands are in the best condition they have been in this century, I do not intend to leave the impression that they are producing anywhere near their potential. I believe that outputs of certain products, such as forage and red meat, can easily be doubled. It is my thesis that the rangelands deteriorated rapidly after the arrival of European people and their herds and flocks. On the whole, the rangelands of this country have improved over the last few decades and will continue to improve in the future.

Our past use of the rangelands is riddled with misconceptions, mistakes, and poor judgment related to the ability of the ranges. When the first pioneers entered the virgin rangelands of the Western Hemisphere, they were over-optimistic about its carrying capacity. They tended to judge the carrying capacity of these ranges by those of the more humid ranges from whence they came. With the very best of intentions they stocked and overstocked the range.

They conquered the wilderness and they began the process that led to a vast and rapid deterioration of the rangelands of North America. In most areas the ranges were overgrazed within two decades after the first European settlers established a livestock industry. The same process can be documented both in the humid range-

rying capacity of the rangelands that they encountered. The journals of early explorers in America were filled with such glowing phrases as "seas of grass," "grass belly-deep to a horse," and with descriptions of an unlimited supply of grass that could maintain thousands of head of livestock.

The pioneers took these glowing remarks at face value and virtually ignored the numerous warnings by the explorers of vast wastelands and areas with forage so sparse that horses were unable to find feed for a week or more at a time.

The white man came West with the urge to tame the wilderness and convert the vast grasslands to economic gain. Grass was thought to be plentiful and free. Profits were great. Private ranchers and large corporations established enterprises throughout the West. The attitudes of these early people were described by H. L. Bentley in 1898.

Men of every rank were eager to get into the cow business. In a short time every acre of grass was stocked beyond its fullest capacity. Thousands of cattle and sheep were crowded on the ranges when half the number were too many. The grasses were entirely consumed; their very roots were trampled into the dust and destroyed. In their eagerness to get something for nothing, speculators did not hesitate at the permanent injury, if not the total ruin, of the finest grazing country in America.

Although Bentley laid the blame for this deterioration of the ranges to speculators and profiteers, the same deterioration was brought about by well-meaning and dedicated settlers who wanted to make a new life in the rangelands of the West. Howard Clegg (1976) in analyzing the records of the Mormon Church at Grantsville, Utah, found that deterioration of ranges came soon after settlement. The following quotation is from the *Desert News* dated September 25, 1879:

The wells are nearly all dried up and have to be dug deeper. At the present time, the prospect for next year is a gloomy one for the farmers, and in fact, all, for when the farmer is affected, all feel the effects. The stock raisers here are all preparing to drive their stock to where there is something to eat. This country, which was once one of the best ranges for stock in the Territory, is now among the poorest; the myriads of sheep that have been herded here for the past few years, have almost entirely destroyed our range.

Thus, both speculators and religious refugees trying to make a new life in the West made the same mistake of over-estimating the carrying capacity of the range. Reports from the Great Basin and the Red Desert of Wyoming show the western range was overgrazed and depleted prior to the arrival of the 20th century. The pioneers still living in the West tell of ranges so denuded that sheep bands in the mountains could be counted by the clouds of dust from the valleys. Both official records and folklore indicate that the ranges deteriorated rapidly after European settlement and that "unlimited grass" was indeed limited and did not last more than one or two decades after settlement.

Historical Assessment of Range Condition

The first assessments of range conditions were largely notes made by untrained observers who explored the

lar goal at the time when an estimate is made will determine procedure, techniques, and accuracy of sampling, it is safe to assume that each estimate has its own bias because of its intended use. The reader may have a separate goal from the person who collected the data and the two interpretations may differ completely.

The unfortunate fact is that the available evidence is not sufficient to formulate a comprehensive judgment on the present condition of the public range, and no one has adequately compiled and analyzed what evidence there is. Until a more complete attempt is made to assist the current state of the western rangelands, opinions will continue to differ and remain at the hypothesis stage.

There are currently new assessments of the range being made under the Resources Planning Act and the Resources Conservation Act. We can only hope that they will give us a better assessment of the current condition. However, the preliminary data appear to me to be made from broad estimates rather than from careful measurements in the field.

Recent Legislation Affecting Rangeland Policy

The environmental movement spawned in the 1960's and reaching its peak on Earth Day, 1970, generated a myriad of legislation that would affect public and private rangelands and their management. The National Environmental Policy Act established the procedure for analysis of environmental impacts and required the issuing of an environmental impact statement on any significant action that affected the public welfare. Other legislation for the protection of clean water, clean air, and environmental quality in general put restrictions on the use of herbicides and other range improvement tools on both public and private rangelands. While most of the legislation affecting private rangelands came through the attempt to control environmental quality, several acts were passed in the last decade that directly affected the management of the public rangelands.

The Resources Planning Act of 1974 required a complete assessment of the capability of all rangelands and a program for the management of those under the stewardship of the USDA Forest Service. Similar legislation specifically for the private lands came through the passage of the Resources Conservation Act. The Soil Conservation Service now has major responsibility for the collection of the data on private rangelands. Together two acts now require an assessment of all the rangelands of the United States.

The National Forest Management Act of 1976 amended the RPA to provide for integrated land use planning. Forest and rangelands must now be planned with a degree of sophistication that has not previously been required. The Federal Land Management Policy Act directs that the public rangelands will be planned on a scientific basis and managed for multiple goods and services. The recent Rangeland Improvement Act sets aside funds for the improvement of the rangelands.

I will not attempt to go into detail on the individual acts, since it seems that this will be adequately covered in the rest of the symposium. However, in their entirety I think that the recent legislation shows that Congress

will be used for the production of multiple goods and services, that they will be managed with the best science available, that they will be managed by public input to determine goals for outputs, that the effects of management will be monitored, and that if detrimental changes do occur, then the management will be changed to improve the rangelands. In my opinion, this apparent intent of Congress raises a number of important policy issues to be considered by this group at the seminar today.

Policy Issues Affecting Rangelands

It is clear to me that rangelands are intended to be multiple-purpose lands managed for the production of many goods and services. Section VI of the National Forest Management Act provides for an integrated land use plan of all forest and rangelands. Though the regulations of the Federal Land Management Policy Act are not as specific or as detailed, it is my opinion that Congress intended, and indeed in the future administrative structures may dictate, that all rangelands have a single, integrated land use management plan.

This will be difficult for most public agencies, since they have thought in terms of functional units dealing with recreation, forage, wildlife habitat, etc. Extensive revisions in regulations, manuals, and handbooks will be required, as will retraining of personnel to adequately assess the capability and suitability for multiple goods and services and assess the tradeoffs between them.

Another apparent intent of Congress is that the results of management should be monitored on the nation's rangelands. Too often agencies have taken action without ever evaluating the results of their actions. Who will deny that the monitoring of the effects of management is needed? Yet, I believe that few realize the implications of this requirement.

New and more precise techniques must be devised and data collected of sufficient accuracy to allow detection of change. For instance, in some of the grazing environmental impact statements recently produced, changes of only a few percentage points are predicted in key forage species, or changes of only a few kilograms per hectare of production may be estimated. In many cases, biological sampling techniques now being used are so imprecise that changes predicted simply cannot be measured accurately.

I have talked at length about range conditions earlier. The major reasons that range conditions cannot accurately be compared between agencies or even between units within an agency is that techniques may measure entirely different things. For instance, the Soil Conservation Service uses a technique that measures deviation from ecological potential. Much of the data now available on BLM ranges were collected using a technique that measures livestock forage productivity. A single desert range could be measured using the two techniques. The deviation from potential system might show the range in excellent condition, while the forage productivity system might show it in poor condition.

There is an urgent need to have a single, defensible technique for measuring range condition and trend. An inter-agency committee and a committee of the Society for Range Management are now studying the possibility for developing such a technique.

Not only is it necessary to have a system for measuring range condition that will estimate the amount of forage for livestock, but the technique should estimate the capability of the land to sustain the various multiple uses. In my opinion a system that measures the ecological potential of the land, that is, describes the climax potential plant communities, their animal counterparts, and relates them to the soil resource, would be the most useful in determining that capability.

Not only should capability be determined, but it is also necessary to determine the suitability of rangelands for each of the various multiple uses. While capability is primarily a test of the ecosystem's ability to withstand a use or produce a product, suitability takes into consideration the economic situation and the wants and desires of people. The use of suitability tests implies an analysis that would subject data to a range of alternatives and select that alternative which best produces the particular mix of goods from the rangelands.

Another major issue that will be facing agencies managing rangelands in the next few years is the upgrading of the qualifications of their personnel. Some may argue that, with the removal of much of the discretionary power of the range manager through more stringent laws and regulations, it is not necessary to have in-depth training in any particular field. I would argue strongly against such an approach. I believe that it is imperative to have more and better-trained resource managers. Budgets have always been small and personnel numbers inadequate. That is one reason why the western ranges have not improved as fast as they should. In analyzing the need for managers on the public rangelands, Box, Dwyer and Wagner stated:

Even in the best of times management agencies have not had an adequate number of trained range management professionals. We believe that the problem has been intensified rather than helped in recent years. For instance, economy moves have caused both the BLM and the USDA Forest Service to combine grazing districts, ranger districts, and forests. Each economy move means fewer people being asked to do more with less funds. In addition, qualified range people are being asked to do many non-range jobs because many times they are the best trained ecologists on the staff.

This is the view not only of the authors but of a number of groups ranging from conservation groups to professional societies to producer organizations. Better training for range managers will mean not only improved instruction in the traditional disciplines of ecology, animal husbandry, wildlife management, soils, etc., but also a new kind of orientation and training dealing with involving the public in decision making, analysis of alternatives, and economics. These new requirements will be not only a challenge to the agencies, but to the universities to train people properly so that the agencies may hire them.

Another policy issue that must be resolved in the next few years is the position of Federal agencies toward exotic animals. This particular problem is complicated

by good intentions, who force erroneous biological decisions on the management agencies. A good example is the wild horse situation on western ranges. We have good, well-meaning, dedicated people who want to save our national heritage by protecting wild horses. Laws are written and interpreted by judges that call wild horses "wildlife." This is not a biological fact.

Wild horses are not wildlife; they are an exotic animal introduced into a natural habitat, and are capable of the same destructive forces as domestic animals. In fact, because they are uncontrolled, exotic animals can destroy ranges more completely and quickly than domestic animals. As an agency struggles to protect the wild horse as required by law, it may very well sacrifice native animals, their habitat, and the domestic animal industry as well.

Although the wild horse is only one example, there are many others. In most cases, feral goats, hogs, and other not-so-glamorous animals have been considered as nuisances and destroyed. It would make a lot more sense to approach the entire problem of introduced exotic animals as an ecological or biological question, rather than to decide which animal is "nice" and which one is "bad," and try to proceed with management accordingly.

A similar problem exists with rare and endangered species. Most of the activities dealing with these rare and endangered organisms have been in the animal area. The pupfish and the snail darter have both attracted nationwide attention, and there is some indication that Congress may reverse itself on the value of these rare and endangered species. Evolution is much more rapid in the plant kingdom than in the animal, and there are many strains, varieties, and even species of plants that evolved in a particular area. Art Holmgren at Utah State University has recently found a penstemon that grows only on abandoned mine spoils in southern Utah. The question becomes ludicrous when we consider whether we will have to manage for abandoned mine spoils to protect this particular species.

The designation and maintenance of wilderness areas will also have to be faced squarely in the next few years. At the time of enactment of the Wilderness Act most people considered wilderness from the purist standpoint, and used quotations from Aldo Leopold and others to justify these pure areas scarcely touched by human hand.

Enactment of the eastern wilderness bill redefined wilderness, in that it can now be created from areas that have been logged over or used by man. The recent RARE II exercise by the Forest Service has moved the concept of wilderness as a renewable resource squarely into the western realm. The RARE II study has identified and suggested for wilderness designation areas that were severely depleted, overgrazed, and overcut as late as three or four decades ago. If these areas meet the new concept of wilderness, then wilderness, beyond any shadow of a doubt, has been established as a renewable resource. Argument for setting aside large areas before they are lost holds no merit.

These are but a few of the many areas that must be

developed. Never before in our history have the rangelands of this country had more demands made upon them. Not only will the rangelands continue to be used for livestock production, but society will demand many other goods and services from them. Recreationists, hunters, water users, and others will demand their particular products from rangelands. They will often be in conflict, one with the other. Budget and personnel allo-

cations for managing these rangelands, however, have largely been justified by single use livestock grazing, and it is significant to note that the Office of Management and Budget considers grazing use a residual use of rangelands. It may be that the biological questions of rangelands will be much easier to answer than the political ones, and I hope that we wrestle with both in this symposium.

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CONDITIONS OF RANGELANDS ADMINISTERED BY THE U.S. DEPARTMENT OF AGRICULTURE, FOREST SERVICE

By

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The U.S. Department of Agriculture, through the Forest Service, administers some 187 million acres of federally-owned forests and rangelands. About 20 million acres are in Alaska and the rest, 167 million acres, are in the 48 contiguous States. These lands include National Forests, National Grasslands, and Land Utilization Projects in 42 of the 50 States. Collectively, the Federal lands administered by the Forest Service are called "National Forest System Lands" which has been shortened to "NFS lands." These lands provide a variety of goods and services to the American public in accordance with Federal laws and departmental regulations and policies.

My remarks will be concerned only with the use of the forage resources on the 117.3 million acres of forests and 49.6 million acres of rangeland on NFS lands in the 48 contiguous States (fig. 1). The Forest Service administers no forest or rangeland in Hawaii, and there is now no commercial livestock grazing on Forest Service-administered lands in Alaska. In this discussion, I wish to provide information about the grazing use of NFS forest lands and rangelands and about the condition of the rangelands.

Grazing Use of NFS Lands

The NFS range is comprised of a complex array of forest and rangeland ecosystems characterized by a variety of life forms. They include forest lands of the East, piney woods of the South and Southeast, tall and

short grass prairies of the Great Plains, pinyon-juniper and semiarid shrublands of the Southwest, and the mountain meadows, grasslands and forests of the West.

About two-thirds of the lands administered by the Forest Service in the contiguous States are open to commercial grazing by livestock. The rest are closed for one reason or another. Some lands are occupied by dense forest and not producing livestock forage. Some do not have the inherent potential to produce enough forage to make grazing feasible or economical, or they cannot be used without risking undue damage to soil resources. Still other lands are closed to grazing for other reasons. For example, some lands are dedicated to recreation, some are closed to protect key wildlife areas, and some watersheds are closed to protect municipal water supplies.

About 102 million acres of NFS lands in 36 of the contiguous States are included in 11,000 grazing allotments, and are open to commercial grazing by livestock under paid permits.

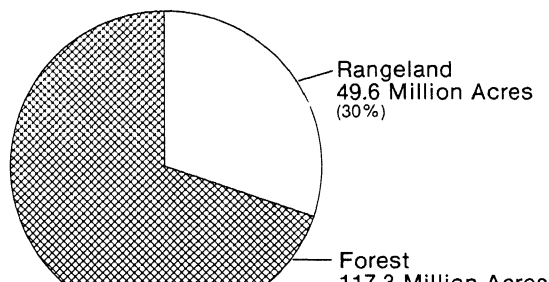
In 1977, some 15,700 ranchers and farmers paid the Federal Government over \$11 million to graze 1.4 million cattle, 1.3 million sheep, and 18,000 horses and mules. This livestock consumed 8.8 million animal unit months of forage—7.8 million by cattle and 1.0 million by sheep. An animal unit month of forage (or AUM) is the amount of forage, about 750 pounds, required by a 1,000 pound cow or its equivalent for 1 month.

In addition to the animals under paid permit, the NFS ranges provided some 73,000 AUM's of forage free of charge for 19,000 cattle, 20,000 sheep, and 12,000 horses owned by 3,400 landowners who used the animals only to meet family needs. An estimated 116,000 horses and mules used by 83,000 recreationists also grazed free of charge for short periods of 1 to a few days.

A Few Definitions

Some terms common to range management have often been misused in the past. This has resulted in considerable confusion in the communication of both range data and range ideas. Therefore, it might be well at this

Figure 1. National Forest System, Forest and Rangelands



this panel, has assured me these are also the definitions used by the Soil Conservation Service.

Forest land is land that supports, or will support, a native vegetation dominated by trees. Rangeland is land on which the native vegetation is predominantly grasses, grass-like plants, forbs or shrubs. These definitions are life-formed oriented and are independent of the use being made of the land.

The definition of range, on the other hand, is use-oriented. Range is defined as being all lands producing, or that are capable of producing, native vegetation that will provide forage for grazing or browsing animals, and those lands that have been revegetated to introduced species to provide cover that is managed like native vegetation. Range, therefore, includes rangelands and those forest lands that, continually or periodically, naturally or through management, will support an understory of native vegetation that provides forage for grazing or browsing animals. The key concepts in the definition of range are (A) forage for grazing or browsing animals is produced by native plants, and (B) if the forage is produced by introduced species, the plants are managed as if they are natives.

Since condition of rangelands is the title of this panel, we should be clear as to what we mean by rangeland condition. Condition of rangeland is the present status of the rangeland relative to what it should be for the site. This is an ecological rating and both present vegetation and soils are considered in determining the condition. Principal factors used to rate the ecological status of the present plant community are its composition, cover and vigor, though plant age classes and production are also used. Soil factors considered are ground cover and current soil erosion. The ecological status, of course, can vary along a continuum from low to high (fig. 2). Rangelands rated to be above the midpoint of this continuum are considered to be in satisfactory condition, and those below are considered as being unsatisfactory.

Range trend is simply change in condition. In rangelands, if the trend is towards the high end of the con-

tinuum, the trend is deemed to be upward. If the change is towards the low end, the trend is downward.

Condition of NFS Rangelands

An assessment was made in 1977 to determine condition of NFS rangelands based on the definition and upon the vegetation and soil factors I discussed. This assessment shows that about 68 percent of the rangelands are in satisfactory condition, i.e., fair (44 percent) or better (24 percent), and 32 percent are in unsatisfactory condition (fig. 3).

No comprehensive national survey of trends in condition of NFS rangelands has been made. Nevertheless, we believe the overall trends are generally upward, though there are still many places where downward range trends must be halted and reversed to protect basic soil and vegetation resources. Although there is now no national inventory of trends, the Public Rangelands Improvement Act requires the Secretary of the Interior and the Secretary of Agriculture to develop and to maintain on a continuing basis an inventory of range conditions and trends. The Forest Service has developed a comprehensive range management information system that will enable it to make the condition and trend inventories required by the Public Rangelands Improvement Act. Elements of this system are now being tested.

Summary

The U.S. Department of Agriculture, through the Forest Service, administers some 167 million acres in the 48 contiguous States, of which almost 50 million acres are rangelands. Most of the rangelands are in grazing allotments and are open to commercial grazing by livestock. A little more than two-thirds of the rangelands are considered to be in satisfactory condition. Although trends in condition in the past decade are believed to be reassuring, the hard fact remains that almost one-third of the rangelands are still in unsatisfactory condition, and much of the satisfactory rangeland still needs additional improvement. USDA policies must be directed to seek this improvement wherever possible in a cost-efficient manner.

Figure 2. Rangeland Condition, What Is It?

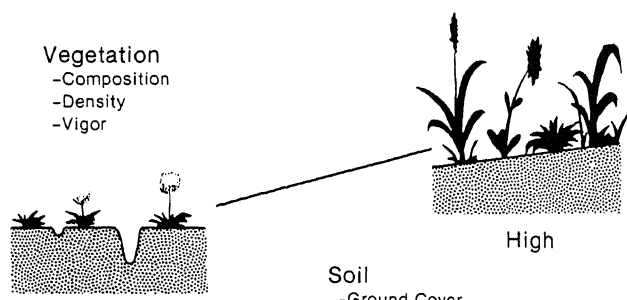
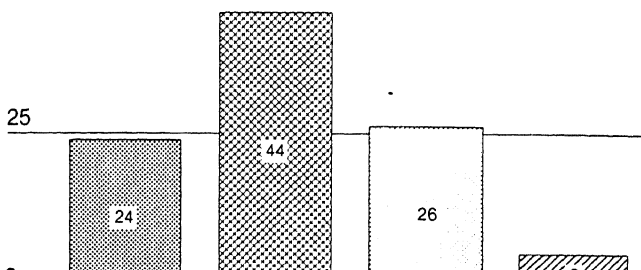


Figure 3. Forest Service Rangeland Condition — 1976
Percent
50



EXTENT AND STATUS OF NON-FEDERAL RANGELANDS OF THE UNITED STATES

By

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Chief Range Conservationist, Soil Conservation Service

Lyle Bauer, President of the National Association of Conservation Districts (NACD), said in the Newsletter January 2, 1979:

"Two-thirds of the Nation's land is owned and managed by private individuals, businesses, and corporations. From that land flows most of the goods and services to meet the needs of people. Virtually all food, and most timber products, comes from private land. The quality of the water that enters and leaves these lands, the purity of the air that passes over them, the wildlife that inhabits them, and the scenic vistas they provide are basic to the quality of American life. The protection of these lands through a strong national soil and water conservation program is in the public interest. . . ."

The U.S. Department of Agriculture, through its many programs, exerts a profound influence on the use and management of these lands. The Soil Conservation Service (SCS) is the technical assistance arm of USDA. Through local conservation districts, SCS helps individuals and groups plan and carry out conservation programs and practices by providing technical and cost-share assistance. With minor exceptions, SCS does not own, operate, or directly manage rangeland. Hence, my comments are limited to non-Federal land.

The object of this paper is to construct a picture of U.S. non-Federal rangeland—its extent, location, condition, and certain trends. It is based on the latest available data. In fact, some of the estimates are so fresh that they are still preliminary. I hope the information will be helpful in evaluating the strengths and weaknesses of USDA policies as they relate to non-Federal rangeland.

The 1967 Conservation Needs Inventory (CNI) of 1971 has long been quoted as the most authoritative inventory of non-Federal rangeland in the United States. The primary objective of the inventory was to gather information about the use and condition of privately owned rural lands and to identify and locate conservation problems and needs. It was a joint effort of nine agencies of USDA and USDI with statistical help from two universities.

Stratified random sample plots were selected in every county of the United States. These plots were permanently located on aerial photos and index sheets. The number of samples and size of plots varied according to location and intensity of land use. Sample areas covered from 1 to 8 percent of the land area. Plot size ranged from 40 to 640 acres (16 to 259 ha) but most commonly was 160 acres (65 ha). About 38 points (overseas) were

of a template. Land use and conservation needs were ascertained at each of those points by actual field examination in 1967. The point data were summarized and expanded to the county inventory acreage. Finally, county CNI committees examined the raw data and adjusted them according to local knowledge. The adjusted data were published in 1971.

Several resource inventories conducted by SCS in recent years have enabled us to update the CNI data for rangeland and to make some deductions and interpretations concerning range condition, use, trends, and erosion. The most important of these inventories are the 1975 potential cropland study, published by SCS in 1977, and the 1977 erosion inventory, to be published by SCS in 1979. The information from the 1977 erosion inventory compared with the 1967 CNI enables us to examine a decade of change. As in the 1967 CNI, all 3,000 U.S. counties were again sampled in the 1977 erosion inventory. About one-third of the original plots in each county were checked, but only 3 points per plot were evaluated rather than 38.

Location and Extent of Non-Federal Rangeland

The 1977 erosion inventory showed that 99 percent of the total non-Federal rangeland is in the 17 Western States. The other 1 percent is scattered from Minnesota south to Louisiana, in Florida, and in a narrow band of marsh range along the Gulf Coast. More than 50 percent of the non-Federal rangeland is located in four States—Texas (23 percent), New Mexico (10 percent), Montana (10 percent), and Arizona (9 percent).

Overall, the 1977 erosion inventory indicates an increase from 380 million to 408 million acres (154 to 165 million ha) in non-Federal rangeland during the decade 1967 to 1977. Seven of the 17 range States and one in the Southeast show a significantly greater inventory acreage of rangeland in 1977.

A significant change was arbitrarily defined as 1 million acres or 10 percent of the 1967 base acreage in a State. Those States showing this increase are Arizona, California, Colorado, Nevada, New Mexico, Texas, and Florida (table 1). Most of the increase, especially in the Southwest, is attributed to reclassification rather than to an actual increase in rangeland. A great deal of piñon juniper and chaparral land called non-comm-

Table 1. Trends in Condition of Non-Federal Rangeland, by State, 1963 and 1977

STATE	TREND	STATE	TREND	STATE	TREND
Arizona	+	Nebraska	+	South Dakota	+
California	-	Nevada	0	Texas	+
Colorado	+	New Mexico	+	Utah	0
Idaho	0	North Dakota	+	Washington	+
Kansas	+	Oklahoma	+	Wyoming	+
Montana	+	Oregon	+	All States	+

the 1977 erosion inventory. In Florida, some savanna land of very low site index was likewise reclassified as rangeland.

Only two range States, Montana and Nebraska, show a significant decrease in rangeland acreage during the decade. This decrease is attributed to a conversion of rangeland to wheat land in Montana and to center pivot irrigated cropland in Nebraska.

These facts and figures relate to rangeland only. In addition, the 1977 erosion inventory shows 18 million acres (7.2 million ha) of native pasture, 61 million acres (24.7 million ha) of grazed woodland, 116 million acres (47 million ha) of improved pasture, and 7 million acres (2.8 million ha) of native hayland.

Land Use Changes and Trends— Rangeland and Pastureland

The 1975 potential cropland study indicated that from 1967 to 1975 just over 4 million acres (1.6 million ha) of rangeland and pastureland were converted to urban built-up and water areas. For all practical purposes, this represents an irreversible loss of about one-half million acres per year. Nationally, such conversions have had little effect on range use, management, or production, but locally they may have had a significant effect. During the same time, there was a net gain of 21 million acres (8.5 million ha) in pasture and rangeland from cropland. The potential cropland study also indicated the conversion of forest land to rangeland that I spoke of earlier. Again, this was principally the result of reclassification rather than actual conversion.

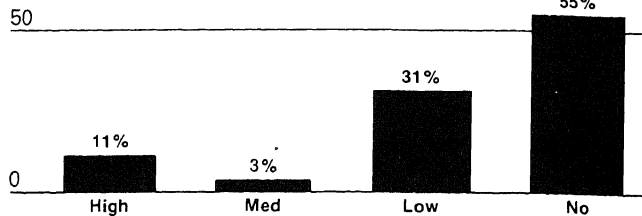
One other significant finding of the potential cropland study was that 11 percent of the Nation's non-Federal rangeland has high potential for conversion to cropland; 3 percent, medium potential; 31 percent, low potential; and 55 percent, no potential. In other words, 86 percent has little or no potential for conversion to cropland (fig. 1).

Range Condition

Early in 1977, SCS State Conservationists and their technical support staffs were asked to estimate the percentage of non-Federal rangeland in the four range

Figure 1. Potential of Non-Federal Rangeland for Conversion to Cropland, 1975

100

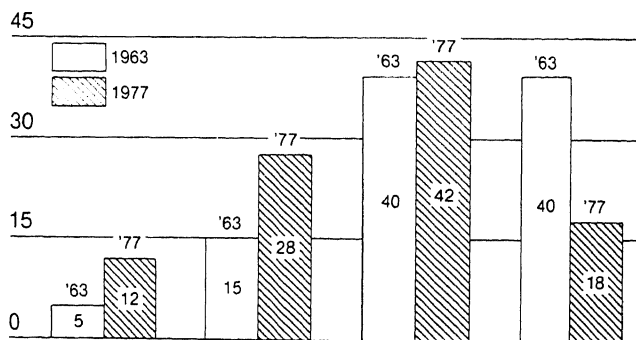


been requested by the Forest Service for use in their 1980 RPA appraisal. These estimates of range condition were compared with similar estimates made in 1963. For several years we have felt that range condition has been improving significantly on non-Federal rangeland. Yet we could quote no figures to substantiate those feelings. Statistically, we still cannot because these indications of range condition are only estimates.

For several reasons, however, we believe that the estimates have some validity. First only a few, if any, people participated in both the 1963 and 1977 estimates of range condition. Scarcely anyone remembered the 1963 survey when we accidentally uncovered it in our Washington office files. Second, I doubt that many people in the range States ever dreamed that someone in Washington would compare their estimates of range condition with estimates made 14 years earlier. Thus, I feel reasonably sure that they did not arbitrarily jack up their 1977 estimates to show improvement in range condition.

At any rate, the comparison revealed that between 1963 and 1977 range condition improved markedly (fig. 2). Nationally, the non-Federal rangeland estimated to be in excellent condition increased 7 percent, that in good condition increased 13 percent, that in fair condition increased 2 percent, and rangeland in poor condition decreased 22 percent. An analysis of the estimates

Figure 2. Percent of Non-Federal Rangeland by Condition, Class - 1963 and 1977



for the 17 range States shows that range condition improved substantially in 13 States, remained more or less static in three, but declined noticeably in one (table 1). Range condition also declined significantly in one State in the Southeast. There are circumstances in the two States that may explain the estimated deterioration of range condition over the past 14 years. Though time will not permit me to discuss them here, I will be glad to discuss them with you individually.

Rangeland and Erosion

Field employees making the 1977 erosion inventory used the Universal Soil Loss Equation (USLE) to estimate erosion at each point that fell on rangeland. Total tons of soil moved by sheet and rill erosion on rangeland was divided by the total acres of non-Federal rangeland within a State to arrive at the average amount of soil moved per acre per year. Rill erosion rates on rangeland in 1977 ranged from 0.5 to 10.0 tons per acre. The national average was 3.4 tons per acre. Arizona, California, Colorado, and Texas show rates that are excessive. A legitimate question is just what part of the total is natural or geologic erosion and what part is accelerated or induced by man's activities.

Obviously, it is not correct to say that wind erosion occurs only in the Great Plains States. SCS employees outside the Great Plains, however, are not trained to estimate or measure wind erosion. New Mexico and Texas were the only two States in the Great Plains that showed excessive rates of wind erosion. It is important to remember that the 1977 erosion inventory was made during or immediately after a severe drought in much of the West.

Range Condition and Erosion

For years, range men have postulated that there should be an inverse relationship between range condition and erosion. Plant cover as reflected in range condition is one of several important factors that influence erosion rate. Others are soil, topography, and climate—all of which are considered in the identification and delineation of range sites. One must also remember that some seral plant communities are more resistant to erosion than the climax vegetation for the site. On most range sites, however, we expect erosion to increase as range condition deteriorates.

Unfortunately, range condition was not determined at each point on rangeland in the 1977 erosion inventory. Nevertheless, we analyzed the inventory printouts to see if there was any kind of correlation between ero-

sion rates and estimated range condition. The 17 range States were arrayed in an ordinate ranking according to the percentage of non-Federal rangeland estimated to be in good and excellent condition.

Estimates ranged from a high of 64 percent in North Dakota to a low of 17 percent in Nevada. The States were also arrayed according to the percentage of rangeland estimated to be in poor condition. These estimates ranged from 6 percent in Wyoming to 46 percent in California. Next, the States were ranked with respect to sheet and rill erosion. Ostensibly, there was no positive or direct correlation between estimated range condition and sheet and rill erosion in the individual States.

Further analysis revealed, however, that where more than 40 percent of a State's non-Federal rangeland was estimated to be in good and excellent condition (8 States), sheet and rill erosion rates ranged from 1.1 to 2.7 tons/acre/year and averaged 1.9 tons. Additionally, where 15 percent or less of rangeland was estimated to be in poor condition (6 States), sheet and rill erosion ranged from 1.1 to 2.7 tons/acre/year and averaged 2.0 tons.

Thus, we might conclude that where more than 40 percent of the rangeland is in good and excellent condition or where 15 percent or less is in poor condition, sheet and rill erosion rates are apt to be in the environmentally acceptable range. For the next appraisal, we hope that range condition will be determined and recorded at each evaluation point that falls on rangeland. This will permit a direct comparison of erosion and range condition.

Brush and Brush Management

There are two aspects of range management that deserve your special attention. First is brush management.

For years conservation district leaders have identified brush encroachment as one of their biggest conservation problems. They point out that unwanted and undesirable woody plants reduce production of food and fiber, accelerate erosion, unnecessarily waste water, and in many places degrade wildlife habitat.

In 1972 SCS gave wide circulation to a questionnaire regarding "problem-creating" woody plants. It was sent to university people, extension workers, SCS employees, and ranchers. The most frequent and serious woody pests mentioned were oaks, junipers, sagebrush, cactus, rabbitbrush, mesquite, and acacias. The questionnaire was followed in 1973 by a brush survey. As a result of the survey, SCS estimated that brush occupied more than 277 million acres (112 million ha) or about 68 percent of non-Federal rangeland. This was almost the same acreage that had been estimated 10 years earlier in 1963; the decrease was less than 1 percent. There was,

however, a significant change in brush density, as follows:

	Sparse	Medium	Dense
1963	31 percent	30 percent	39 percent
1973	36 percent	31 percent	33 percent

There was an increase in sparse brush and a corresponding decrease in dense stands. This shift indicates that brush management activities of ranchers, farmers, and USDA have been directed at dense stands where brush is dominant in the plant community, seriously suppresses growth of more useful plants, and severely restricts the use of land.

The data also suggest that brush management practices have been successful in reducing brush stand density, but in no way threaten eradication of brush. As a matter of fact, the realization by ranchers and USDA employees that in most cases eradication is impossible and imprudent prompted the use of the terms brush management and brush manipulation instead of brush eradication. In many places, brush management practices are a substitute for the extensive wildfires that occurred before settlement by European man and that held brush stands in check.

For several years, USDA has had technical assistance and cost-share programs for brush management and grassland restoration, and these have done a world of good. Surely there have been a few poorly planned and executed jobs that resulted in blights on the landscape. But these are in the minority. Research and experience have taught us a lot about brush management in the past 10 years or so, and the tradeoffs involved.

If brush management is deemphasized now, and if technical assistance and cost-share programs are restricted, all that has been gained will be quickly lost. Brush management can be made even more effective with fewer undesirable side effects by requiring that cost-sharing be based on an overall plan. Such plans should be prepared by the landowner or operator with the assistance of a professional range conservationist and submitted to the conservation district board of directors for approval. These plans should give proper consideration to all appropriate uses.

Grazing Management

The second aspect of range management that must be

considered is proper grazing use and planned grazing systems.

Grazing need not result in range deterioration. In other words, grazing is compatible with other uses if proper use and planned grazing systems are an integral part of the management. Range degradation accompanies unplanned, haphazard grazing.

SCS records indicate that about 70 percent of non-Federal rangeland is properly used. Of course the percentage varies from year to year. About 18 to 20 percent is managed under some kind of a planned grazing system. The acreage has been increasing at the rate of 6 to 7 million acres (or 2 percent of total rangeland) per year for the past several years.

Summary and Conclusions

Up to now little or nothing has been said about forage production, water quality, wildlife habitat, riparian vegetation, or desertification. All these topics are listed on the program for consideration of this panel. Rather, I have spent most of my time discussing range condition, erosion, and grazing management. Since range condition as used in SCS is an ecological rating that compares the present plant community with the climax vegetation for the site, range condition is directly related to all these topics. If range condition is improving, forage production is likely increasing and water quality and wildlife habitat are improving. On the other hand, declining range condition indicates a deteriorating ecosystem. Erosion rates are directly related to forage production, water quality, and desertification. Proper grazing use and planned grazing systems are key practices for the maintenance or improvement of all range resources.

Admittedly, with 60 percent of non-Federal rangeland in fair and poor condition, we have a long way to go in protecting the resource and optimizing the mix of products and services from rangeland. But thanks to the ingenuity, industry, and sense of stewardship on the part of many range users, we have already come a long way. With added commitment from Congress through recent legislation, from agency administrators, and from the American public, we could be on the threshold of a new era in range management.

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RANGELAND CONDITION

By

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In the time remaining, I will try to do three things. First, it seems to have fallen to me to present, in highly condensed form, some basic information about the condition of the rangelands administered by the BLM—reviewing briefly the status and trend picture painted in BLM's 1975 *Range Condition Report*.

Second, I'd like to explore a few issues concerning wildlife habitat and riparian ecosystems that relate to the earlier presentations, and comment on the uses of the range condition data.

Finally, I'll focus on the political question of whether or not we're actually going to get on with the job of restoring the public rangelands to an acceptable condition.

BLM Range Condition

BLM is responsible for managing grazing on approximately 150 million acres of public rangeland in the 11 Western States. According to the Bureau's 1975 "Range Condition Report"—which is still the most current data available—83 percent (135 million acres) of those lands are in unsatisfactory condition, and only 17 percent (28 million acres) are in satisfactory or better condition.

The tabular breakdown is:

Class	Acres (in millions)	Percent of Total
Excellent	3.2	2 percent
Good	24.	15 percent
Fair	81.5	50 percent
Poor	45.6	28 percent
Bad	8.2	5 percent

As of 1975 trends in range conditions were seen as:

Trend Direction	Acres (in millions)	Percent of Total
Improving	31.	19 percent
Static	105.	65 percent
Declining	25.7	16 percent

The Report recognized that condition and trend were not good, but pointed out that conditions had improved considerably since 1934 when the Taylor Grazing Act was passed. During those years, BLM has slowed or stopped declining conditions on a majority of their rangelands, but has reversed the decline on only 19 percent of the acreage. Between 1964 and 1975, BLM notes a slight upward trend, which is attributed to intensive management under allotment management plans.

indicate that in twenty-five years productive capacity could decrease by as much as 25 percent—a decline that could be reflected in the possible loss of livestock grazing privileges Other losses will be suffered in terms of erosion, water quality deterioration, downstream flooding, loss of wildlife and recreation values, and decline in basic productivity.

Turning to erosion condition, the Report found that 91 percent of the national resource lands were sustaining some soil loss and that 10 percent were in critical or severe erosion condition. Thirty-five percent were considered moderate—losing soil during heavy storms, showing some loss of productivity, and susceptible to rapid deterioration; 46 percent were rated as slight—showing no real damage as yet; with 9 percent rated stable. The 45 percent in the moderate, severe, and critical categories are considered unsatisfactory. Continuation of the 1975 trend would increase the unsatisfactory category to over 50 percent by the end of the century.

For wildlife, the Report found only 52 percent of big game habitat to be satisfactory, and a declining trend that would reduce antelope by 7 percent, bighorn by 8 percent, and elk by 16 percent by the year 2000, and see the extirpation of the desert bighorn by the year 2000. The wildlife trend table shows that habitat for small game and nongame wildlife is also on a downward trend, with roughly 60 percent static, 30 percent declining, and 10 percent improving. Fish habitat was said to be in better condition, with 65 percent static, 12 percent declining, and 23 percent improving—but the data for this category were incomplete.

Wildlife Habitat Trend Present Situation

Class of Wildlife	Improving	Static	Declining	Total
Big Game				
Acres (1,000)	13,037	95,908	52,348	161,293
Percent	8.0	59.5	32.5	100
Small Game				
Acres (1,000)	17,230	100,408	51,244	168,882
Percent	10.2	59.5	30.3	100
Nongame ¹				
Acres (1,000)	16,725	91,201	51,463	159,389
Percent	10.5	57.2	32.3	100
Fish ¹				
Miles	60	171	33	264

AUDUBON magazine. In talking about the condition of the range, the author likened the range surveys to the body counts of the Vietnam War.

The comparison is somewhat lurid. But it caught my attention because it captured a concern over the reliability, credibility, and usefulness of the range survey data that I had heard expressed by a variety of resource professionals.

These questions are significant, I think, because the survey data form the raw material for planning, management, and policy decisions. If the data are seriously in error, management will suffer. If the data are widely perceived as being unreliable or skewed to serve institutional ends, they will be heavily discounted and their testimony of need will be rejected by the public and by the decision makers in Washington. Finally, if the surveys do not ask the right questions, or if they focus narrowly on only part of the resource, the resulting data will present an incomplete and potentially misleading picture of condition and trend—a picture that simply fails to tell us much of what we need to know.

Let me offer a few concrete examples of the sort of problems I have in mind:

(1) What is it that the term “range condition” measures? Both the Forest Service and BLM assess range condition in terms of an ecological rating. But I must confess to some remaining uncertainty about what it is that the term “range condition” measures—or has measured, as used by the several agencies over the last 10 years.

Many wildlife professionals seem persuaded that range surveys have, in practice, focused narrowly on forage species, that preferred livestock forage species have typically been selected as key species while critical browse species have not been so considered, and that critical escape, nesting, birthing, or rearing cover have not been considered at all. In this view, the range conditions that we’ve been discussing have tended to be defined in terms of use—and more particularly in terms of use by livestock. As a result, range condition surveys tend to be largely assessments of grass.

I think this perception explains the widespread ambivalence among wildlife advocates about range management programs that are aimed at the goal of improving something called “range condition.” We’re not sure what it is we’re buying, and we suspect that is skewed toward a single dominant use.

(2) Under the heading “Wildlife Habitat Condition,” BLM’s 1975 Report informs us that 53 percent of its big game habitat is in satisfactory condition, defined as “habitat that is producing at its potential.” At the same time, only 17 percent of BLM range is rated as satisfactory, even though a less stringent criterion is applied.

It is difficult to reconcile those two figures. When they are placed side by side the wildlife habitat rating hardly appears credible, and one is tempted to conclude that perhaps wildlife is just more easily satisfied than livestock. However, a more serious explanation lies in the fact that deer account for 85 percent of the big game on BLM lands. The big game habitat is therefore

offered an assessment of deer habitat, misleadingly labeled. Habitat conditions for big game species other than deer remain unknown. However, it appears likely that, for grazing animals such as antelope or elk, the data may mask conditions that are more nearly in line with general range condition and far worse than the 53-percent satisfactory figure claimed for big game habitat.

(3) A 1968 Forest Service survey determined that 35 percent of the National Forest System range was in satisfactory condition. Those data were re-used in the 1973 Forest Environment Report and again in the 1975 RPA. I understand that a new survey, carried out in 1977 in connection with the 1980 RPA exercise, shows nearly 70 percent of National Forest System range in “satisfactory” condition.

That is dramatic progress. In fact, it is so dramatic that it invites questions about its reality and the reliability of the data base. Were the 1968 and 1977 surveys conducted on the same basis? Did they measure the same thing? Is the baseline established by the 1968 inventory reliable and useful? Or is it so uncertain that we can make only the most general statements about trend?

Finally, one might ask what significance this has for policy. Are there generalizations about trend that we can make an adequate guide for framing broad policy directions? Or are we constrained to postpone all action pending better data? Clearly, better inventories are needed. But my bias is that we cannot afford to defer all management pending the arrival of better data, and that the science of range management is partly the art of making good decisions based on bad data. Dr. Box or Jack Schmautz may want to respond to these thoughts.

(4) I don’t want to engage in semantic quibbles. And I certainly don’t want to detract, in any way, from the Forest Service management efforts that have succeeded in bringing about the undoubtedly real upward trend in range condition that underlies the statistic that I’ve just been questioning. But, at the same time, I’m concerned that the “70 percent satisfactory” statistic may tend to lull us into undue complacency. “Satisfactory” is used by the Forest Service to mean that the land is producing at or above 40 percent of its biological potential. But to most of us—and to most members of the Appropriations Committees—satisfactory means something very different, something like “good enough.” I am not at all sure that, as a matter of policy or politics, it is wise to have federal resource lands producing at below 50 percent of their capability designated as “good enough.”

(5) Still focusing on the term “satisfactory,” it should be pointed out that the Forest Service and BLM uses of the word are not comparable. To the Forest Service, “satisfactory” means all lands that are rated “fair” or better. To BLM, only lands rated good or excellent qualify. Apparently, the Forest Service—like BLM’s wildlife—is more easily satisfied. I suspect that this is not the only case in which the Forest Service, BLM, and SCS use the same term differently, or use different terms to mean the same thing.

Effects of Livestock Grazing in Nevada, when it found that "... based on the prevalence and magnitude of licensed non-use and based on our observations of range conditions, the range surveys that have been made are grossly non-applicable to present range conditions." I would be interested to hear from other members of this panel whether their experience tends to confirm that finding.

(7) I am concerned that critical components of the range resource are being systematically left out of the range condition picture because the surveys are not asking all the right questions. Sweeping generalizations about range condition don't provide much detail, and for many important resources, it is the detail that tells the story. Take as an example the key habitat areas that tend to determine the size and health of wildlife populations—such areas as elk winter range, sage-grouse booming grounds, deer calving areas, or riparian ecosystems. If we are told that the range condition trend is sharply up, can we confidently assume that these key habitats are also improving? Or are these critical components of the overall rangeland resource being ignored by the survey reporting process, as they have historically tended to be ignored in planning and management?

An example: BLM's "Range Condition Report" acknowledges that the limiting factor controlling the size of a wildlife population is usually a critical area or habitat component. Nevertheless, the wildlife habitat condition data in the Report are compiled simply on the basis of acreage, without weighing critical habitat. In other words, winter range and summer range are held equal, acre for acre. As a result, the aggregate habitat condition data don't define the trends in wildlife carrying capacity or wildlife populations, and it seems likely that the data systematically understate losses of wildlife carrying capacity.

Riparian ecosystems are an obvious example of key segments of the overall range resource that have tended to get lost in both the inventory process and in planning and management—and that are in trouble as a result. They may warrant a closer look.

In the arid and semiarid West, riparian ecosystems are areas of extraordinary biological productivity and diversity. The water and characteristically lush vegetation of the riparian zone provide a critical habitat component for numerous species of game and nongame fish and wildlife. For the same reasons, these areas are also magnets for recreation.

Unfortunately, riparian ecosystems are highly susceptible to damage from concentrated livestock use, and livestock use is concentrated because of available water and the strong preference of cattle for the more palatable riparian forage. Unregulated livestock use typically results in a gradual loss of streamside vegetation, increased water temperature, excessive bank erosion, and increased sedimentation of gravel beds. The net effects of these changes include reduced carrying capacity for most fish and wildlife species, loss of diversity, and reduced biological productivity.

over the loss of riparian habitat and mounting evidence that the problem is pervasive, and that the situation is serious. There are reported examples of quality streamside grazing management. But many observers have concluded that protecting and restoring riparian habitat will normally require total exclusion of livestock, except for short gaps for watering purposes, until vegetative communities have been restored, with carefully controlled, limited use thereafter.

Fencing of riparian habitat would be expensive; exclusion of livestock would be controversial. But because of the extremely high recreational, fish and wildlife, scenic, and soil and water values of riparian zones, the managing agencies possess special management responsibilities towards these areas—responsibilities that have recently been sharpened by two Executive Orders which require protection of wetlands and floodplains.

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In the time remaining, I'd like to turn to a discussion of politics. Given that the condition of the public range is unacceptably bad and that methods to improve it are available, the remaining policy issues connected with range condition are basically political: Are we going to do something to rehabilitate the public rangelands? How much? At what pace? And at whose expense?

A few months ago, it looked as though those questions had been answered, at least in broad policy terms. In passing RPA, FLPMA, and, last year, the Public Rangelands Improvement Act, the Congress and the President made the political commitment to restore the productive capacity of the rangelands, decided to make the necessary investments, and set the country on a 20-year schedule of range rehabilitation. Or so I thought before the budget was released last Monday.

The Administration's FY 1980 budget calls into question the reality of that new Federal commitment to range improvement. For range management, the proposed budget is, quite simply, a step backwards. Let's take a look at the budget.

In fiscal 1979, BLM had approximately \$68 million and 1,000 positions to carry out its overall range management program, including range, soil and water, and wildlife. To meet its expanding responsibilities and to begin the shift upwards to the higher level of activity mandated by Congress, FLPMA, the Rangeland Improvement Act, and the Sikes Act authorize a total of \$90.4 million for fiscal 1980.

But the Administration's budget proposal provides a total of only \$68 million for FY '80. That is \$22.4 million below the authorized level and essentially the same as last year—before correction for inflation. In the face of a 9-percent inflation rate, it is clear that the budget contemplates a sharply reduced management effort.

Because the total request is less than the FLPMA authorization alone, the budget shows zero funding under the Rangelands Improvement Act. That is an ominous precedent.

The proposed budget also involves a cut in the total number of positions for BLM. While we can't tell how that cut will be allocated across programs, it is clear that the range management program will continue to be hamstrung by a debilitating deficiency in manpower—a deficiency of about 400 slots at currently authorized levels.

The Forest Service range budget for fiscal 1979 provided \$37.3 million for the National Forest System, \$2.3 million for range research, and \$515,000 for State and Private, for a total of \$40,115,000. The President's budget for FY 1980 calls for cutting the National Forest System range account to \$35.8 million (down \$1.5 million), slashing research to \$1.53 million (down \$.8 million), and trimming S&P to \$400,000 (down \$115,000).

The proposed FY 1980 total is \$37,730,000, a drop of \$2.4 million below last year. Without even correcting for inflation, the cut works out to approximately a 6-percent reduction. The RPA Program calls for a 1980 budget level of \$58.7 million in 1975 dollars. The proposed budget falls short by \$23 million in 1979 dollars; it is less than two-thirds of the RPA level.

In terms of the Federal range management effort, these cuts translate into a very significant loss of momentum in the short run, and imply a virtual desertion of the recently established schedule for rehabilitation. For both the Forest Service and BLM, the proposed 1980 budgets for range management mark a potentially critical change in direction, a step backwards towards the custodial era.

We are all aware of what the White House is calling the "New Realities": inflation, Proposition 13, the taxpayers' rebellion, a sudden lull after a balanced budget, the Administration's pledge to hold the Federal deficit below \$30 billion for fiscal 1980.

Those things are new realities, and they will make it difficult to win adequate funding for range management programs.

But we are also aware of a number of old realities that underline the need to make the attempt.

It is an old reality that Federal range management programs have always been at the end of the line. In good years and bad, OMB decides that spending on range resources is "deferrable." The gradual decline of the range is undramatic; the constituency for range programs is seen as narrow and regional. It is always a safe place to cut.

It is an old reality that the Federal rangelands are in deplorable condition: producing at only a fraction of their potential for wildlife or livestock, contributing to siltation and water pollution, losing their future productivity through soil loss and invasion of undesirable vegetation. We have heard this morning that 83 percent of BLM rangelands are in "unsatisfactory" condition and that nearly a third of National Forest System range is producing at less than 40 percent of its capacity.

It is an old reality that deferred maintenance is a false economy. Every year that range restoration efforts are delayed raises the price tag on eventual rehabilitation,

It is an old reality that the depressed condition of these lands is primarily a result of over-grazing and under-management—during the last century, the First World War, and the Depression. And that both problems are still with us today.

It is an old reality that range condition can be improved, that downward trends can be reversed, and that productivity can be restored for the full range of multiple uses and values.

But the overriding reality is that the public rangelands will not be restored to anything approaching full productivity without a sustained infusion of money and manpower—for planning, management, and on-the-ground improvements. And that that goal will not be attained without a sustained political effort by all users of the public rangelands.

On the surface, it may appear that there is no reasonable hope of succeeding, in this era of fiscal austerity, in securing support for range management—support that has proved unavailable during the periods of prosperity and Federal largess over the last 30 years. There is no question that 9 percent inflation and Proposition 13 will make the job more difficult. However, there are a number of reasons why it may prove possible.

The next Presidential election year is 1980, and both parties will be searching for issues. I don't believe, and I don't think that the political strategists in the White House believe, that the President can afford to write off the West in 1980.

The White House must be particularly anxious to find a way to heal the political wounds left by the Administration's water policy initiatives. Grazing programs could be the issue to help quiet the overheated rhetoric of a War-on-the-West—if westerners are willing to move a range improvement initiative to the top of their political agenda.

The public rangelands are rapidly gaining a wider, national constituency. The diverse publics of recreationists, wildlife enthusiasts, rock hounds, and others, who a decade ago had never heard of BLM, now think of the public range as their lands, making range improvement politically more attractive on a national basis.

A meaningful rangeland improvement initiative would not be a costly program, at least on the scale by which Federal programs are judged. For an effective range rehabilitation program, BLM and the Forest Service will need an extra \$36 million in FY 1980, not much compared to some of the big-ticket items in this year's budget.

Finally, we should be encouraged by the personal commitment to this issue shown by President Carter last year when he signed the Rangelands Improvement Act into law, over the vocal protests of his advisers at OMB.

To put range management efforts back on the schedule established by RPA and the Rangelands Improvement Act, we must forge a new political reality of

It will require a concerted effort by all of the client publics that have a stake in the public rangelands to communicate that reality to Washington and make it stick. In recent months, as the Administration finalized its budget, the conservation community made it clear to the White House that increased funding and manpower for range rehabilitation was a top priority for 1980. The livestock associations urged funding the Rangelands Improvement Act. Clearly, our joint effort was too little, too late.

To succeed in 1980 or 1981 where we failed in 1979 will require: (1) sustained effort; (2) a wide range of support—including the academic resource management community and recreation groups, as well as conservationists and livestock interests; and (3) a much fuller use of the political apparatus—including the Western Governors and the Governors Conferences, the State party mechanisms, the 1981 primaries, the party platforms, and, of course, the western congressional delegations.

Over the last 40 years, the Izaak Walton League and the livestock associations have been at odds innumerable times. I don't know that we've ever agreed on anything. It is sad to give up such a reliable, well-worn, comfortable adversary relationship, but I'm afraid the time has come. We can no longer afford to let our history of conflict obscure the fact that our interests substantially coincide.

So I want to urge the livestock organizations to focus their demonstrated political power on the goal of range rehabilitation, as enthusiastically and effectively as they wielded that power on behalf of a change in the grazing fee formula. The House Appropriations Committee will be hearing outside witnesses on February 26th for BLM and March 1 for the Forest Service. We should be there in force: academics, ranchers, and conservationists. The Senate committee has not yet set its schedule.

In establishing the political basis for rangeland improvement, I recognize that we will probably continue to have disagreements about the proper role of reductions in grazing allotments and about the correct grazing fee formula. For our part, we believe that there are no panaceas, and that, even with sharply increased investments in range rehabilitation, there will have to be cuts in allotments to give the range a chance to recover.

We may also disagree about the design of a rehabilitation program and the mix of benefits to be produced. We are convinced that intensive management will not work if it is focused single-mindedly on producing livestock forage. It will not work biologically, and it will not work politically. The old slogan that "good livestock management is good wildlife management" should be laid to rest by range managers as it has been by wildlife professionals. An intensified range manage-

ment effort must be a balanced multiple-use program that even-handedly serves all of the resource values.

I hope that we can agree on that. But I am confident that we can agree that range rehabilitation efforts should be sharply accelerated; that there is an urgent need for both increased funding and additional manpower; and that expanded efforts are needed in both planning and on-the-ground management.

I'm sure we can agree that the whole schedule of investment and activity in range management must be shifted upwards, as promised by RPA, FLPMA, and the Rangeland Improvement Act; and that we can not accept a Federal budget that defaults on the promises of those Acts and dissipates the momentum generated by their passage. Despite our differences, these areas of agreement should provide the basis for a workable, effective political effort to get range rehabilitation back on the track.

The alternatives are unacceptable. We cannot afford to return to the paralysis of the last 30 years, years that saw the range managing agencies frozen, suspended between their fear of reducing allotments and the vain hope that massive public investment in range improvements would make that action unnecessary. Since the 1940's, the dream has been that we could have more forage and more cattle, if only enough money were available for range improvements. But the dream has been a trap; the promised investments have not materialized; and the range has continued to deteriorate under the pressure of grazing livestock—too many, too concentrated, turned out too early, and left on too long.

We cannot tolerate another 30 years, or even another 3 years, of that paralysis, while waiting for an influx of funds.

As I've said, we need to work together to boost the Federal range management effort onto a higher schedule within the next 2 years. I think we can succeed.

But at the same time, BLM and the Forest Service must take action to adjust grazing use—by livestock or wild horses and burros—to bring it into line with the capacity of the range to sustain that use, while providing for wildlife and restoring itself to satisfactory condition.

If that action is not taken, if the paralysis persists, we will soon see intense popular pressure for wholesale reductions in grazing allotments, rather than selective adjustments. That is an alternative that I am sure most people in this room would prefer to avoid.

I submit that working together to bring into being a balanced range management program at a higher level of effort offers a way out. It is a way that leaves no one fully satisfied, one that requires some compromise by each interest, but one that would benefit all users of the public range, as well as the range itself.

Thank you.

PANEL II

Allocation of Range Resources: How do you decide what is appropriate (livestock, wildlife, wild horses and burros, other considerations)?

NEPA AND BEYOND

By

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The public rangelands of this Nation support a variety of important and valuable resources and resource values. In addition to supplying forage for livestock and wildlife, the public ranges are important watersheds. They provide habitat needs for both grazing and nongrazing wildlife species as well as recreational opportunities. They contain significant historical and archaeological resources. Unfortunately, many of these lands and their resources are not in good condition. This is particularly true of the rangelands with which I am most familiar—those managed by the Bureau of Land Management. For example:

- Wildlife habitats on BLM lands are deteriorating.
- Countless archaeological and historical resources have been irreparably destroyed.
- Eighty-four percent of the public rangelands are in fair, poor, or bad condition.
- Almost one-half of the lands are in unacceptable erosion condition.

According to the BLM, the Council on Environmental Quality, and many others, these conditions are the result of poorly managed livestock grazing. Unquestionably, poor management of grazing does not always mean that range resources have been improperly allocated. However, many of our ranges are suffering from this general problem. Some areas are being overgrazed by livestock. Other areas which simply are not suited for grazing are being grazed nonetheless.

In many areas, nonforage or nongrazing values have been overlooked by the Bureau in managing livestock grazing. In many areas, allocation decisions have been based on insufficient information and inadequate consideration of the environmental impacts of those decisions. These improper allocation decisions must be remedied to conserve the fundamental resources of our public lands—their soils, their waters, and their vegetation. In many cases, the needed remedy will involve reductions in livestock use.

This is not to say that domestic livestock should be removed from the Public Lands. The forage resource of these lands is a renewable resource which can be used and re-used by livestock, as well as wildlife, when properly managed. The public ranges do make important contributions to the economies of local areas and

will suffer as well as environmentalists, sportsmen, recreationalists, and indeed, the Nation as a whole.

There are a number of potential tools available for making better allocation decisions. I believe that one of the most useful of these tools is the environmental impact statement process mandated by the National Environmental Policy Act of 1969. As many of you undoubtedly know, the Bureau is currently in the process of preparing impact statements in connection with its livestock grazing programs as the result of a successful lawsuit filed by the Natural Resources Defense Council (NRDC) and several local environmental organizations.

These impact statements will analyze the effects of existing and proposed grazing upon the resources of particular areas of the Public Lands. If properly prepared, these EIS's will fulfill a number of significant objectives. They will candidly reveal the problems, if any, which are occurring in a given area as the result of existing allocations, as well as any conflicts which cannot be resolved. They will analyze the trade-offs in management opportunities, resource uses, and environmental impacts of different allocation decisions. They will identify a variety of different solutions for specific management problems. They will provide a sound foundation for monitoring subsequent allocation and other management decisions. Finally, they will provide an opportunity for informed and meaningful public participation in decisionmaking regarding range allocations. In sum, these grazing impact statements will provide the environmental and other source material about the areas involved which is needed for informed, rational, and realistic decisionmaking regarding the allocation of range resources.

Although the earliest grazing statements that were prepared by the BLM were almost universally criticized by the individuals and groups commenting upon them, more recent statements have reflected considerable improvement. Nonetheless, it is fair to say that many people, including some Bureau employees, believe that important problems relating to the contents of these statements as well as the process by which they are prepared have yet to be resolved.

In the past several years, NRDC attorneys have spent a substantial amount of time talking to ranchers and

tion, about the problems that they perceive with respect to these impact statements and the process. Although NRDC and these groups were adversaries in the past, our conversations have revealed that we agree that grazing statements prepared so far have suffered from a number of serious problems.

Several of these problems relate directly to the utility of grazing statements as tools for making allocation decisions. They concern 1) the alternatives discussed in the EIS's; 2) the BLM's policy toward intensive livestock management; 3) the treatment of grazing capacity in the EIS's; and 4) the timing and nature of public participation in EIS preparation.

NRDC and the ranchers we have been speaking to agree that, in general, the alternatives discussed in grazing statements have been inappropriately selected. Instead of being genuine alternatives to the proposed action with which the statements deal, the so-called alternatives have been designed to rationalize decisions previously arrived at by Bureau officials.

We agree that grazing statements must analyze alternatives which involve allocations of range resources which differ significantly from the proposed action, as in fact some of the more recent statements have done. In addition, we agree that the statements should consider management techniques which differ from those involved in the proposed action and which could be used to produce different allocations of range resources. The grazing statements prepared to date have not considered such techniques which include, for example, nonintensive systems of livestock management.

Instead, all of the grazing EIS's have clearly reflected the BLM's unchanging intention to implement intensive management of livestock grazing on the Public Lands and, in particular, rest-rotation grazing systems. NRDC and the ranchers we have spoken to feel that the BLM appears to believe that rest-rotation is a panacea for all of the problems of the Public Lands, including allocation problems. Ranchers are opposed to rest-rotation because they perceive it as an unwarranted intrusion into their ranching operations. The concerns of NRDC include the fear that rest-rotation will be applied in lieu of needed reductions in livestock use.

Nonetheless, we agree that there is no panacea for our range problems: local conditions must determine the particular management techniques which should be used. Moreover, we question whether the funds available to implement intensive management on the scale envisioned by the BLM will ever be forthcoming. Clearly, EIS's which allocate range resources in connection with grazing systems which will never be implemented because of financial restraints are of little use.

As indicated, another concern that we share with ranchers relates to the treatment of grazing capacity in these grazing statements. Unquestionably, the allocation of vegetative resources must be based on the grazing capacity of the areas involved. Grazing statements must analyze the present grazing capacity of the areas involved and relate initial range allocations to that information. We share a number of concerns about the inventory system the BLM proposes to use to obtain this

data it wants or ideally needs to prepare EIS's and to make resource allocations. The Bureau must endeavor to remedy these data gaps as quickly as possible. In the meantime, the agency needs to make the best judgments it can, based on the best available information and to use this information as a starting point for long-term management.

We are seriously concerned that the BLM will not have the money, trained staff, or time needed to implement its new inventory system. If it does not, short-cuts in the system will have to be taken. These short-cuts may result in data which are of reduced utility for use in making initial allocation decisions. They may also result in data which are less useful as a basis for future monitoring. To the extent that subsequent impact statements are based on such data, their usefulness will be seriously compromised.

The final concern with respect to grazing statements which ranchers and NRDC share jointly concerns the timing and nature of public participation in EIS preparation. Informed and meaningful public participation is both a goal and a requirement of the NEPA process.

If properly prepared, grazing statements should not raise questions about the BLM's candor or the technical adequacy of the methodologies used in their preparation. Reasonable people reading these EIS's should be able to agree on whether serious allocation problems exist in a given area as well as on what opportunities exist to resolve the problems. This is not, of course, to say that everyone will be satisfied with the decisions which are made following their completion. In many cases hard choices will have to be made. It is a dangerous illusion to believe that the Bureau will be able to satisfy everyone under such circumstances. Although the Bureau cannot satisfy everyone, it can and should create and maintain a climate in which all interested people will have confidence that their views will be considered in a responsible manner.

To date, the Bureau has failed to create such a climate. One of the most important reasons for this failure is the Bureau's refusal to invite the public to participate in planning for EIS's prior to starting intensive preparation efforts. Although we recognize that such planning must be essentially an agency activity, we believe that public participation is appropriate and necessary. The public should have an opportunity to analyze available inventory data and to assess additional inventory needs. In addition, the public should have an opportunity to help identify significant local resource conflicts. Finally, the public should be encouraged to suggest alternative allocations of range resources and management strategies which could be reasonably considered for the particular area.

The failure to allow such participation not only creates bad feelings, it also affects the contents of the grazing statements themselves. For example, as I have indicated, they have failed to consider range allocations based on alternative management techniques which reflect local needs and desires. Moreover, the failure to

the preparation process frequently makes it difficult to consider them later because the data needed to analyze their impacts were not collected during the inventory period. The lack of such data is one of the reasons the Bureau has advanced to explain why it has not made substantial changes in proposed actions or alternatives after completing draft EIS's. The failure to make such changes contributes further to a lack of confidence in the Bureau's willingness to respond to public concerns.

While the Bureau has made progress in preparing grazing statements, these problems need to be resolved, so that future statements will fulfill their full potential as tools for making better allocation decisions. I hope that some of these problems will be resolved in the new planning process which the BLM is currently developing. I believe that others will be solved by the preparation of clear and comprehensive guidelines for the contents of future statements. Although the Bureau has agreed to prepare such guidelines, which should ensure that past mistakes are remedied, as well as that new mistakes are avoided, they have not yet done so.

As I have emphasized, even legally adequate, technically sound and publicly acceptable grazing statements are only a tool for use in allocating range resources. They do not, in and of themselves, answer the ultimate question of what range allocations should be made in a given area. By its very nature, this decision must be made at the local level. It should be based on statutory requirements and policy considerations as well as the environmental source material contained in grazing statements. It is at this point that some of the most serious problems the Bureau has in allocating range resources occur.

The Bureau is a highly decentralized organization which prides itself on the degree of flexibility given to local managers. I do not dispute the desirability of giving flexibility to field employees. Nonetheless, I

believe that the desire to maintain such flexibility has blinded agency officials to their responsibility to provide greater and more specific guidance to field employees for use in making allocation decisions, as well as in planning generally.

Both the Bureau's new Organic Act as well as the Taylor Grazing Act contain numerous general statements and requirements regarding the goals and objectives of public land management. Directives to "stabilize the livestock industry" and to manage the Public Lands in a manner "that will protect" the quality of environmental values are subject to extensive yet different interpretations at the local level. Moreover, such directives may compete with each other in individual cases at that level. Unfortunately, most of the policy statements issued by the Bureau are vague and generalized.

These vague and often competing statutory and policy requirements make it difficult for local employees to base allocation decisions on firm foundations. They produce inconsistencies in decisionmaking that are not the product of local conditions, but local managers' unguided interpretations of applicable requirements. In addition, the absence of clear guidelines to be followed by decisionmakers makes it extremely difficult for the public to participate meaningfully in decisionmaking and creates a great deal of unnecessary confusion.

Consequently, I believe that the Bureau should develop, with public participation, better policy direction for its field employees so that priorities among resource values and uses can be more easily set and allocation decisions facilitated.

If such policies are provided, their use in connection with subsequent grazing statements should lead to improved allocation decisions in the future and, in turn, to much needed improvement in range conditions.

ALLOCATION OF RANGE RESOURCES

By

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The American livestock industry is vitally concerned with the problem of allocation of public rangeland resources. Historically, the industry has supported the principles embodied in the Taylor Grazing Act of 1934 and its amendments, and the Multiple Use Act of 1968. The industry opposes any law, rule or regulation which restricts or in any way inhibits a livestock operator's ability to make his own management decisions about how his operation is to be run as long as those decisions will not have a proven adverse impact upon the Federal land. The industry is willing to admit that errors have been made in the past, and we must correct our mistakes and move ahead with the best possible practices.

The American rancher is concerned that Federal land policies do not force private lands out of food and fiber production by making it impossible for private landowners to retain or acquire new food-producing lands. Range livestock production continues to be a major phase of agricultural production in the Western States and will probably become more important in the future.

We must do all we can to preserve this Nation's food-producing system—a system which permits Americans to spend less than 20 percent of disposable income on food. This is less than in any country in the world. Thus, it is apparent that this means that many Americans have more income for use on other pursuits, such as leisure time activities and other "life quality" values. This also means that as a Nation we have placed minor emphasis upon those who produce and supply necessities such as food.

It is obvious that the need to provide lands for outdoor recreation is going to increase in the future, as more people are being freed from the requirement of supplying the necessities of life through their own work efforts. As populations increase, less land will be available to supply food and fiber. This can create obvious problems for the consumer and the producer.

Allocation of range resources means a balance of the supply of forage with demand. This becomes the estimated grazing capacity an area will support. If range is

in poor condition, grazing capacity must consider improvement of the forage condition and soil stability. Present capacity should be based upon current range condition, and the system of management to be adopted.

There is no easy formula which permits an easy, accurate determination of grazing capacity, for many variables are involved—weather, plants, soil, competition between game and livestock. A given area must be analyzed completely, and this means a survey of the total condition of that area. The livestock producer is cognizant of all that this process involves. He is more than willing to cooperate and adjust to any system which will provide fair and realistic range allocation to livestock and other range users.

Remember, simply removing livestock from the land does not solve the problem. If the livestock producer were to be forced off the public range, it would be impossible to maintain a viable livestock industry. It is our understanding that the Public Rangelands Improvement Act of 1978 does approve of livestock on the public lands, and contains provisions for the funding for management of rangelands, water development, and recreation. In spite of the Department of Interior being in favor of this Act, we hear that the President feels such funding is not available. This is difficult for the industry to understand.

In summary, our industry desires to continue livestock operations on the public range; we are totally committed to a stable, sensible plan to provide adequate allocation of this land to the appropriate users, with no group being favored over another. We are opposed to large acreages of private food-producing lands being appropriated for public land. The industry recognizes the need to establish reasonable and adequate grazing standards for public rangelands. If the ranger is forced off the public lands, one of his alternatives will be to consider his adjacent private lands for development purposes. This is not a viable solution.

ALLOCATION OF RANGE RESOURCES FOR WILDLIFE

By

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Director, Colorado Division of Wildlife

Because of the social values of wildlife,

... the public land administrator is obliged to consider and allocate range forage to the support of big game ... Prior use by a single resource user should not obscure the fact that public needs are of paramount importance and should be supplied first. The single resource user must be made to understand that his is a secondary right to be exercised so long as conflict with other uses and needs does not exist.

These strong words on forage allocation are not mine, but those of an eminent authority on rangeland management, Arthur D. Smith, voiced at the 1958 annual meeting of the Society of American Foresters.

At the time of these remarks, multiple use of public lands had not yet been mandated by Congress. Two years later, in 1960, Congress passed the Multiple Use and Sustained Yield Act, which applied to National Forest System lands. Subsequently, in 1964 and 1976, Congress passed similar legislation in respect to national resource lands administered by the Bureau of Land Management. While none of these acts established a priority for wildlife on public ranges, as suggested by Smith, Congress said that the resources of the public lands were to be

... utilized in the combination that will best meet the need of the American people ... with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

Thus, it becomes clear that wildlife should at least receive equal consideration with livestock in the management of public lands.

These acts have not specifically directed the USDA Forest Service or the Bureau of Land Management to make forage allocations for wildlife. However, both agencies have determined that such allocations shall eventually be made. The question then becomes, how to do it?

I will attempt to outline existing and new approaches to making forage allocations for wildlife, describe some of the problems associated therewith, and suggest some possible courses of action to resolve these.

Although my remarks will be confined to the discussion of forage on public lands, it is not my intention to diminish the importance of vegetation in providing

History of Forage Allocation Procedures

Two basic approaches have been attempted to determine proper allocation of range forage for wildlife. One of these involves modifying procedures used for domestic livestock, while the other addresses wildlife independently from livestock. Neither has been very successful to date. Let's take a look at them.

AUM Approach

Rangeland managers have used a combination of factors, including density of forage species, their palatability for different classes of livestock and proper use factors, to estimate carrying capacities of public ranges for livestock. The standard unit of expression in this system is the animal-unit-month (AUM).

It was only natural when carrying capacities for big game or allocations of forage between livestock and big game were considered, that simple conversions of wildlife to livestock AUM's would be used. These conversions were determined by calculating differences in body weights, body surface areas or the amounts of dry forage consumed per day. Using body weights alone, it has been estimated that 9.62 antelope, 5.82 deer and 1.88 elk consume forage equivalent to that of one cow.

AUM conversions based on body weights alone fail to consider a number of important variables, including difference between body surface areas and body weight relationships, metabolic rates, food habits and feeding site selectivity. Of 10 Western State wildlife agencies I surveyed, only two, Nevada and Wyoming, indicated they were using AUM conversions in recommending forage allocations for wildlife.

In the Nevada formula, numbers of game animals are multiplied by number of months they use a unit of range and divided by the appropriate conversion factor to produce the AUM's required for wildlife.

In Wyoming, the number of livestock AUM's on an area are multiplied by a seasonal wildlife-livestock competition percentage and divided by the conversion factor based on body weights. Other factors, like the impact of fences and the availability of water, are also taken into consideration. Fences and livestock considered separately were estimated to reduce antelope carrying

There are two big problems in the ROM conversion approach to allocating wildlife forage. First, since wildlife forage requirements are usually not known, AUM equivalents can't be accurately determined; and secondly, numbers of wildlife using the range are difficult to estimate.

Other Approaches

Several other approaches have been used for measuring forage production and determining utilization by big game animals, including various range analysis methods, range condition and trend transects, and browse production and utilization transects. These methods have certain common characteristics.

Key areas are selected which supposedly represent areas critical to survival of big game animals. Within these areas, key browse species are selected which are supposed to define the capability of the key area to support big game animals. Next, transects are established to measure growth and utilization of these browse plants. It is assumed that these measurements reflect fluctuations in big game food production and utilization over the entire winter range.

This approach to determining range carrying capacity has several deficiencies. First is the total disregard of the principles of statistical sampling methodology so that resulting data may or may not reflect forage production and utilization on that area. Second is the exclusive dependance on measurements of browse with no consideration to the nutritional contribution of other forage classes, such as forbs and grasses. Unfortunately, no method has been devised for accurately determining the quantity of each plant species consumed by big game animals. One scientist recently said that the knowledge of big game food habits hasn't advanced much in 30 years, and he is probably right. For lack of a better procedure, however, many of these techniques are still being used today.

New Approaches for Making Forage Allocations

In the early 1970's, several range scientists started to look for new approaches for determining forage allocations and carrying capacities for big game animals. Nutrition is a key component in the new approach. Simply stated, the amount of nutrition in the available forage supply divided by the forage requirement of the big game species ultimately determines the number of animals that can be supported over a unit of time.

This approach is being tried on an experimental basis in Colorado. Small-scale tests, focusing upon energy and protein supplies of forage and the energy and protein requirements of grazing herbivores, have been completed for mule deer ranges in Middle Park and elk ranges in Rocky Mountain National Park on a State-Federal cooperative basis.

The prototype studies in Colorado require the collection of five types of information, including:

- 1) Delineation of winter range boundaries and dates of use for each big game species;

- 2) Nutritional quantity of big game forage as to digestibility and crude protein content;
- 3) Availability of forage during winter; and
- 4) Winter nutritional requirement of the big game species.

Time doesn't permit me to fully explain the Colorado approach; however, the point I want to make is that all this information is required if we are to accurately determine forage allocations on big game winter ranges. Furthermore, I think it goes without saying that collecting these data on a large scale will be very expensive.

Advantages of Making Forage Allocations For Wildlife and Other Animals

In an effort to determine what the advantages might be to making forage allocations for wildlife and other animals, I polled my wildlife agency counterparts in the Western States. Here is what they reported:

1. Implementation of a forage allocation system would require State and Federal agencies to collectively improve methods for making animal population and forage inventories and determining animal nutritional needs in order to supply the required information.
2. The States would be able to set more realistic big game herd objectives to meet present and future needs, in concert with Federal agencies, based upon available forage resources, with some degree of reliance that such objectives can be met.
3. The nebulous shroud of who gets what would be removed, probably to the benefit of wildlife.
4. It may be possible to obtain reductions in livestock use in important wildlife areas, such as winter ranges, that would greatly benefit wildlife.
5. The allocation system would provide a more rational approach for explaining big game herd management objectives to the public.
6. Such a system would place the Federal agencies in a better position to defend wildlife needs when changes in land use are proposed that would be detrimental to wildlife.

Problems With Making Forage Allocations

There are problems associated with wildlife forage allocations. Opinions among the State wildlife agencies as to whether the present state of the art will permit realistic allocations of forage vary widely. Of 10 States responding on this point, six answered in the affirmative, three in the negative and one didn't know. I think it is significant that five of the six affirmative responses were conditional, indicating some lack of assurance that the job could be done with present know how.

In addition, nearly all Western States are concerned that imposition of forage allocations for wildlife on public ranges by the Federal Government represents an infringement on what has been a selfishly guarded, exclusive right of the several States.

The other big problem, as I see it, is the lack of coordination between the Federal agencies and the States in coming up with a workable system for the

herd could be subjected to several different systems for making forage allocations. This would create an impossible situation.

Recommendations

Here are my recommendations for addressing the problems.

First, I would suggest that a study team be organized to investigate the subject of making forage allocations for wildlife. Team members should include representatives from State wildlife agencies, the USDA Forest Service, and the Bureau of Land Management. They should consider the following questions:

1. What types of information are absolutely essential to permit realistic allocation of forage for wildlife?
2. Do we presently have the means for accurately collecting this information and a viable system for translating it into forage allocations?
3. What should the respective roles of State and Federal agencies be in providing information for a forage allocation system and how should such a system be coordinated between public land jurisdictions?

Once these questions have been answered, the next step, in my judgment, would be for State and Federal agencies to jointly develop and agree upon policies and guidelines for the implementation and administration of a forage allocation system for wildlife.

The problem of meeting costs for implementation of a forage allocation program remains one of unknown amplitude. I would recommend that any system be tested on a small scale to determine costs. If these are prohibitive, the program will have to be streamlined to reduce them or the application of the program will have to be limited.

In conclusion, let me sum up my thoughts on this matter of making forage allocations on public range-lands. I view forage allocation as a two-edged sword. With a reliable information base and impartial administration under the multiple-use concept, I am sure forage allocations are in the best public interest and wildlife will stand to reap substantial benefits. Conversely, forage allocations made arbitrarily or based on deficient information in a politically charged atmosphere could be disastrous for wildlife. I am convinced that, working together, we can come up with a system that will be acceptable to all users of the public lands.

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VEGETATION ALLOCATION

By

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The vegetation community, its composition and condition, is the key to the quality and quantity of the benefits and products from public rangelands. Water quantity and quality, soil productivity, soil stability, wildlife habitat, forage for livestock, wild horses and burros, and aesthetics are all irrevocably tied to vegetation. The single most significant influence on rangeland vegetation is the manner and degree of harvest by all grazing animals. Therefore, the manner and degree to which vegetation resources are allocated and used by grazing animals determines, ultimately, the condition of other basic resources such as soil and water.

The vegetation growing on public rangelands administered by the Bureau of Land Management (BLM) is a highly significant resource which is renewed annually. Decisions concerning the allocation of that resource are probably the most important decisions that will be made because within a rangeland ecosystem, no single element can produce such far-reaching effects on all others as vegetation. Vegetation holds soil and moisture. It provides food and cover. Moreover, vegetation can be readily managed. Its management is paramount to the protection and enhancement of resources such as soil and water values; habitat for wildlife, fish, wild free-roaming horses and burros, and domestic animals; and aesthetic values. These renewable rangeland resource values stem directly or indirectly from vegetation and sustained production of these values depends on management of vegetation.

Because of the importance of vegetation, it must be emphasized again that: decisions regarding the allocation of vegetation will probably be the most important land use decisions made.

Definition

Vegetation allocation is the apportionment of current and potential vegetation among competing uses to achieve and/or maintain a desirable ecosystem for predetermined multiple-use objectives. This includes allocation of that portion of the vegetation identified as forage for consumptive use by livestock, wild free-roaming horses and burros, and wildlife in such a manner which provides for nonconsumptive vegetation requirements for watershed protection, aesthetics,

portioning, or setting aside for a specific purpose, segments of the total vegetation resource in terms of species, amounts, locations, and time of use. It is important to note that these uses can be nonconsumptive as well as consumptive.

Implicit in this definition is that allocation will be based on:

1. Maintenance of plants to protect or enhance the ecosystem, to protect soil productivity, ensure sustained levels of vegetation production, prevent excessive runoff and erosion, and ensure desired water quality.
2. Protection of any plant or animal species, and its habitat, listed or proposed for listing as threatened or endangered.
3. Use of remaining vegetation for habitat, including consumption by domestic livestock, wild free-roaming horses and burros, and wildlife and fish; and for scenic quality and other values based on multiple use and the benefits derived from such use.

Supply/Demand

Allocation of vegetation is simple in theory but quite complex in actual practice. Basically, it is the process of balancing the supply (vegetation) with the demand (requirements for consumptive and nonconsumptive uses) at a specified point in time. Allocation is made more complex because existing and potential uses (the demand) almost always exceed the amount of vegetation available (the supply). Thus, the resource manager must make decisions which involve trade-offs, such as reducing the number of wild horses to provide greater protective cover to the watershed or provide more forage for wildlife. Such decisions are seldom without controversy.

The supply variable is simply vegetation. The amount of vegetation available (supply), both in terms of total vegetation and the portion that may be allocated to competing uses, must be determined. Several inventory methods are available to characterize the vegetation resource. Examples of inventory data necessary for allocation include kinds of plant species, composition, production by species, location, horizontal and vertical dimensions, and other characteristics such as growth

guide management direction to achieve optimum resource production for the site.

Analysis of the inventory data will result in a determination of the amount that can be used, or the allocable portion. This determination must take into account the biologically allowable limits of use of vegetation while providing for maintenance and/or improvement of individual plants and the plant community. The amount of total plant material that may be harvested will vary due to: (1) species of plants available, (2) seasons or periods of use, (3) climatic conditions, (4) kinds of animals, (5) topographic or other physical characteristics of the area, (6) morphological characteristics of the plants, and (7) management objectives.

Once the supply side of the equation is known, the next step is to determine the present and/or potential uses (demand) for the vegetation resource. The demand side of the allocation problem is more complex because of the presence of multiple, competing uses.

In analyzing vegetation demand, considerations will include such items as (1) what uses are present or could be supported on the area (both consumptive and non-consumptive uses), (2) kinds of animals, (3) numbers present or desired, and (4) requirements of the existing and proposed uses.

Each user must be characterized by its relationship with or dependency on the vegetation supply. Users will generally be categorized by types, amounts, locations, and times of vegetation requirements or uses. Typical user data needs would be dietary requirements of livestock or wildlife by season, both the plant species and amounts they consume, location, and vertical or horizontal cover requirements for wildlife or soil protection.

In contrast to the supply side of the problem, very limited data are available or being collected on user requirements. The dietary requirements of many animals, including preference and amount consumed by season, are unknown. The amount of vegetation ground cover to prevent excessive runoff and erosion of soils on various slopes in various climatic zones is largely unknown. Major effort should be devoted by research and land management agencies to accumulate this kind of information.

Analysis and Decision Process

After the supply of vegetation and the demand for use of the vegetation are properly described, the desired mix of users can be determined by reservation of specific amounts, kinds, and locations of vegetation for non-consumptive uses (e.g., plant maintenance requirements, watershed protection, aesthetics, wilderness, wildlife cover). It is important to note that most of these nonconsumptive uses can be fulfilled by one allocation. For example, a decision to leave a certain amount of the total vegetation on the ground may satisfy the needs of plant maintenance, aesthetics, watershed and small animal cover. Then, amounts, kinds, locations, and times of use of consumptive users can be designated by

on allocation are made through the land use planning process. This process compares the vegetation available (supply) against the present or potential uses (demand) in making tentative vegetation allocations. The manager may use a number of techniques, including computer models, to show the various combinations of uses possible on a given area. However, the final decision is made by the professional manager with consideration for the biological, environmental, economic, social, and political factors.

The tentative allocations are subject to a detailed environmental assessment to assist the decisionmaker in determining the environmental impacts of the proposed decision. Alternative allocations are also analyzed through the environmental assessment process.

The entire process, from inventory through land use planning, environmental assessment, and decision-making, includes extensive public involvement and input by all uses and user groups to assist the manager in making sound defensible resource decisions.

The Bureau, as steward of the public rangelands, is obligated to make the most informed comprehensive "best estimate" allocation decision possible. However, rangeland ecosystems are very complex and never static. Vegetation production and community structure as well as users and user requirements change over time in response to man's or other influences. An allocation decision made today will result in a particular mix of users which is subject to change over time because of the constantly changing physical, social, and biological situation.

Monitoring

Due to the many variables in the allocation process, the initial "best estimate" decision is subject to change and adjustments in the mix of users will be necessary. The manager must try to keep demand for the vegetation in balance with the available supply. He must be certain that his initial allocation decision is not causing resource degradation. Therefore, a detailed monitoring program of appropriate studies is required to periodically and systematically collect data to evaluate the present management program and determine if the initial allocation decision is correct. Such studies would include trend in vegetation condition, soil erosion, water quality, habitat, vegetation production, and others. Information from these continuing study plots will assist the manager in determining if adjustments in the mix of users is necessary.

The vegetation allocation process is a continuous process: initial allocation decision, monitoring and evaluating effects of that decision, and periodic reallocation based on (1) changing demands and desires of society and users of the vegetation resource, (2) physical and biological changes in the soil, vegetation, and animal resources, and (3) improvements in inventory data, knowledge of user requirements, and methods of making allocations.

PANEL III

Opportunities to Improve Rangelands, Management, Economic Incentives, Cost, and Benefits: Federal/State and private roles, relationship of private/State/Federal lands, public and private investments, economic constraints, financing, social concerns (community stability, low-income groups).

OPPORTUNITIES TO IMPROVE RANGELANDS

By

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Increases in population, economic activities, and income have boosted the demand for nearly all resources from our Nation's rangelands. An accompanying decline in the rangeland base intensifies the pressure on this great natural resource. We cannot hope to cope with this pressure without making significant changes in present management trends. Positive action must be taken now if supplies are to match potential demands for range products without detriment to the land resources and environment.

There are many opportunities for improvement of our rangeland resources. According to recent reports, nearly three-quarters of the rangeland of the United States is in fair or poor condition; that is, it is producing less than 60 percent of its potential. The USDA Inter-Agency Work Group on Range Production in 1974 estimated that red meat production on U.S. rangelands can be increased threefold while simultaneously increasing other uses.

My observations are biased by the fact that I was first employed as a Soil Conservation Service range conservationist in west Texas during the drought of the 1950's. However, I feel that our ranges are in better condition than when the conservation movement began. Credit for improved range condition should be given first to the ranchers who apply the technology and the finances to conserve our land resources. However, it must also be attributed in large part to the agency personnel who made the appropriate technology available to the private land manager or applied it to public lands. We must appreciate the producer who dedicates his entire life to the stewardship of his land. It is he who has to make the hard decisions of management and then bear the consequences. As I travel through the United States, I see much evidence of good stewardship in the form of vigorous, high-quality range forage for livestock and quality habitat for wildlife on private lands.

Despite some reports to the contrary, public rangelands have also been improved. This improvement would probably have been greater except for political pressure from special-interest groups. The resultant well-meaning but unrealistic regulations that restrict professional judgment of land managers have imposed excessive administrative constraints on public land

unnecessary activities (OSHA reports and environmental impact statements, as examples), they could get on with more important tasks of effective land resource management.

There is much opportunity for improvement in the way land management and service agencies are forced by law to do their jobs. Even SCS conservationists, whose job is technical assistance to landowners, are loaded with so many other activities (such as environmental impact statements related to watersheds and 2,4,5-T RPAR defense), that their time in the field helping ranchers develop management plans and implement conservation practices is seriously limited. Somehow we must let well-qualified agency people get back to the task of managing public lands without edicts and pressure from a well-meaning public who is not technically capable of sound natural resource management. It is the responsibility of agency administrators to correct this situation.

Ranchers are also not immune to the impact of political maneuvering and excessive regulation. Although I am confident that the Nation's producers are going to be able to feed the environmentalists, despite all the barriers to their efforts in the name of the environment, their burden could be eased by removing needless regulations and restrictions. The ranchers are not only the true ecologists but put their money and dedicate their lives to producing food, fiber, and amenities for the rest of the Nation. How can the public justify any action to deny them such tools as 2,4,5-T for brush control and 1080 for coyote control when ultimately the public will suffer from higher meat prices and reduced range productivity?

The 1976 RPA assessment showed that demands for range products will increase above the levels that can be supplied with present management programs and existing facilities. About 1.1 billion acres or 54 percent of the land area of the United States is rangeland or non-commercial forest useable as range. About 70 percent of this range is under private and non-Federal ownership.

The land under private ownership is generally the most productive land. Therefore, efforts to increase range productivity should concentrate on the private land sector, especially since local constraints and policy

made our country the great Nation it is. Given the proper incentives, our producers can and will apply the technology and effort to improve their land and produce the goods and services desired by the public without detriment to our environment.

Although the productivity of the Nation's rangelands is relatively low when compared to cropland, they have the capacity to meet projected demands for recreational use, wildlife habitat, and grazing. Not only can range products be increased, but they can be greatly extended by more efficient utilization. RPA assessment listed the following opportunities for increasing and extending range resources:

1. Recreational demands can be met by constructing additional facilities, improving public access to land suitable for recreation near urban areas, and by integrating all outdoor recreation uses into land use planning and management.
2. The present wildlife and fish situation can be improved by effectively integrating wildlife needs into the management of this resource base for other products such as forage, expanding wetland nesting and wintering habitats, improving fish and wildlife habitat, providing better access to existing resources, and spreading use through time in developing areas.
3. Range forage can be increased and extended by better and more uniform utilization of existing forage, improving quantity and quality of forage by applying known or new range improvement technology, coordinating range management activities with other resource uses, and reducing losses of livestock and forage by improved control of wildfire, insects, diseases, and livestock diseases, predators, and parasites.
4. Water supplies and quality can be increased by intensive watershed protection and management of rangelands by stream and/or vegetation modification.

This symposium and this paper have been developed to offer approaches to achieving these goals. The USDA Forest Service's approach for Forest Service lands is given in the document "A Recommended Renewable Resource Program."

Federal Agency Opportunities

The Federal Government plays a key role in the degree to which the Nation's rangelands can contribute to the economic and social well-being of the Nation. There is ample opportunity for agencies of the Department of Agriculture to properly manage lands for which they are responsible, and to provide technology and incentives to private land owners. Their progress on public land depends upon investments in good management, research, and physical facilities. Their role with private lands is to set a good example and to help people help themselves.

Federal agencies, especially the USDA because of its responsibilities in public land administration and to the agricultural production community, have many oppor-

products and uses. The best opportunities fall in the areas of resource inventory, education, technical assistance, improved financing, and incentives.

Resource Inventory and Monitoring

The first step in placing public and private range management on sound footing is an assessment of the potential productivity, current condition, and trend of our range resources. A national assessment such as required by the Resources Planning Act of 1974 (RPA) and the Resources Conservation Act of 1978 (RCA) would be the basis for comparison, and serve as a basis for policy recommendations for future management direction.

The importance of a soil survey as the basis for a land inventory cannot be over-emphasized. Land is the basic resource, and must be accurately assessed and classified so that land use and treatment can be based on land capability. The Soil Conservation Service has a land capability classification system and a range site classification system related to soil taxonomy. This system permits identification of land management problems, recommendation of conservation systems, determination of best use, and sound assessment of the potential for various uses of the land.

The ecological range site descriptions are the best guides to planning and installing range improvement practices. They identify soil taxonomic units for which climatic, physiographic, and plant community data are collected. This allows ready identification of land-use potential. The compilation of these data into the Range Data System operated by the SCS is a good start in inventory and analysis of the Nation's rangelands. The current RPA assessment should make use of this system.

Additionally, monitoring systems should be developed which incorporate new and developing technologies such as remote sensing. Remote sensing with spacecraft and high-altitude aircraft offers advanced tools for data collection and monitoring. Such new technology should allow improved soil surveys, range ecosystem delineation, condition and trend surveys, and monitoring of other natural resource systems.

Education of Public and Producer

Developing range livestock resources through public education may be the most effective community resource development tool available in many rural areas of the Western States. It certainly presents opportunities for improving range conditions by applying current technology. Many sound technologies are not being utilized to their potential to improve rangeland productivity. They are locked up in files, books, reports and technicians. A more effective program of extending this technology should be devised. The existing USDA land-grant system probably has been the most effective system yet devised, but efforts toward extending range knowledge should receive more attention.

Increasing result demonstration efforts should also be considered to seek new, innovative ways to intensify

educational efforts about range. Result demonstrations are exceptionally effective for promoting application of latest technology and provide large-scale tests for new research. The SCS and Extension Service has used this technique effectively.

Although many excellent examples of adopting the many conservation and production practices developed through the years are evident throughout the private sector, Federal agencies should increase their efforts to promote more widespread adoption of these practices. A concentrated effort to identify, document and publicize examples of successful application of range improvement practices will accelerate their acceptance by producers. Implementation of such practices should also be given high priority on Federal lands by the Forest Service and Bureau of Land Management in cooperation with permittees to set a good example for the public.

Technical Assistance

Although the technical assistance provided by Federal agencies has resulted in significant progress in adopting range management practices, there are many opportunities to increase such technical assistance. More emphasis should be given total range management planning assistance. The systems approach, an integrated approach to planning and management, should be utilized more fully. The integrated approach to technical assistance encompasses planning, installing, and maintenance of range improvement practices. It begins with establishing management's goals and emphasizes maintenance of the improvement practices. It helps the rancher recognize the interdependency of conservation measures and sound management, and the value of installing a complete plan for range improvements.

The number of well-trained range technicians who furnish direct assistance to land managers should be increased. Although new innovative techniques of presenting technical assistance would improve their acceptance, the transfer of range management information to land owners can be accelerated by increasing the competency level of the range technician. This can be accomplished by employing highly qualified range professionals and emphasizing continuing education. Current Civil Service standards for range conservationists are too lax. The result is employment of individuals with minimum training in sound range management technology, and worst of all, little motivation. Again, agency administrators should demand improvement of this situation.

Federal agency assignments and responsibilities in range matters need to be more clearly defined. The value of range should be stressed, especially on forested ranges where other uses have received priority. The multiple-use concept must be practiced rather than being a "paper or lip service" action. Funds and range-trained personnel must be made available to agencies so that land owners can be assured of sound technical assistance.

Economic and statistical information offers producers and policymakers a basis for decisions.

collection, interpretation, and dissemination of economic and statistical intelligence concerning the range-livestock economy would benefit producers, agency personnel, policymakers and the general public.

The main problem with current data available through the Economics, Statistics, and Cooperatives Service is the lack of emphasis on range conditions and range livestock data. A better system for collecting pertinent range and range livestock condition data, its analysis, and interpretation should be devised.

Improved Financing

Financing is a primary limiting factor to implementation of range improvements. Investment capital for range improvements is always scarce, and generally limited to the larger operators with considerable equity. High interest rates and the lack of intermediate-type loans, which match repayments to the schedule of returns expected, prevent ranchers from applying many improvement practices. Lending agencies are reluctant to make loans for range improvement practices which require several years of the investment to produce returns. Consideration should be given to Federal participation in offering of guarantees and lower interest rates on longer term loans with built-in flexible repayment plans.

Incentives

Technical assistance cannot be fully utilized when financing and low economic returns discourage short-term investments in conservation and production practices. Our cost-share programs should be examined closely because they allow implementation of range management practices that cannot be installed otherwise. I recognize the proliferation of cost-sharing practices and the controversy that exists concerning conservation versus production practices. However, most rangeland has a relatively low capacity to absorb inputs profitably, and the rancher cannot always justify conservation practices without obtaining returns on his investment.

We must, as a society, be willing to invest in the future with cost-share programs which will assure conservation of our range resources. Returns to society will be reflected in increased rancher and community stability. Generally, the long-term agreements through the Great Plains Conservation Program have been most successful. This program should be extended and examined for opportunities to offer incentives for both conservation and ecological improvement practices.

The requirements concerning best management practices (BMP's) called for by the Section 208 planning program of the Water Pollution Control Act Amendments (Public Law 92-500) should be examined for opportunities to incorporate ecological range improvement with water pollution control practices. Cost-share incentives may be necessary to motivate ranchers to utilize the best management practice. Application of the proper set of best management practices will not only conserve our soil, but increase range productivity. Implementation of BMP's to control erosion, improve forage

potential for improving rangeland productivity.

Research Opportunities

A Forest Service report in 1970 suggested that problems needing high priority research to meet society's changing needs include: (1) analysis of ecosystem, (2) inventory of range resources, (3) coordination of management and use, (4) improvement of resources, (5) maintenance and improvement of environmental quality, and (6) analysis of social and economic aspects of range resource use.

These needs still exist. More recently, range and forage research needs for red meat production were summarized by a national planning committee of the Agricultural Research Policy Advisory Committee. The general research needs include: (1) improving grasses and legumes for range and forage use, (2) improving management of range and forage crops, (3) reducing limiting factors in range and forage production, (4) improving management of livestock on range and forage, and (5) reducing limiting factors in range and forage-based livestock production systems.

Included in the research need statements are all of the current buzz words for research funding including increasing "photosynthetic efficiency," "energy-saving techniques," and "biological nitrogen fixation." That 1977 report showed that in the 8-year interval from 1967 to 1975, the emphasis devoted to range and forage research declined from 674 to 639 scientific man years, and that there has been a substantial decline in the research problem areas that have a direct input to improving range and forage resources. If our Nation's ranges are to reach their potential, there is an urgent need to initiate a coordinated nationwide research program in range management. This will require strengthening of the on-going Land Grant-Cooperative State Research Service system. The current trend of competitive funding through extra-mural or competitive grants must not replace, but should add to the Cooperative State Research Service-Agricultural Research program. Range research in the Agricultural Experiment

grants are the best approach to securing long-term improvement of our range resources. A competitive grant system will help, but this program should not be allowed to detract from the pragmatic research program of the State-Federal Experiment Station system.

The need for regulatory and definitive research should not displace management-oriented research. We need new innovative efforts (both basic and applied) in management, and biological research applicable to range. Most past research has focused on component parts of the ecosystem, primarily investigation of factors which affect proper stocking and development of range improvement practices as separate entities.

Future research will require greater emphasis on an interdisciplinary approach within the "systems framework." The realization by range professionals and laymen alike that range management includes resource management for all products and uses, such as livestock and wildlife grazing, recreation, and watershed, is long overdue. The challenge is to integrate range research efforts with that of other disciplines and to place it in perspective for society.

Management Opportunities

Intensive management with application of the latest research technology is essential for improving productivity of our ranges. More intensive management requires more competent management expertise. Agencies must strive to obtain better trained personnel and to provide their personnel with continuing education while providing technical assistance, education, incentives, and better financing to producers. Education and technical assistance should include statistical and decision-making assistance whereby each range use is integrated with all other uses within an ecologic and economic framework. Given the economic incentive and the management tools necessary, the rancher will improve the productivity of his rangeland and provide society a ready supply of its products while protecting the environment.

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PROBLEMS AS OPPORTUNITIES FOR IMPROVEMENT

By

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The topic of this panel is "Opportunities to Improve Rangelands—management, economic incentives, cost and benefits." The assigned topic applies to a complicated tapestry of rangelands and could fully use more than one lifetime. It can hardly be addressed in 15 minutes.

Some of my remarks may be a little critical; I hope they're received in the constructive and positive spirit in which they're offered. I'd like to point out some problems as opportunities for improvement, but confine them principally to perspective principles, priorities, and most of all, people. My background and natural bias are to private lands rather than public lands, but I believe they are valid and valuable principles that apply to both and can be transferred from one to the other.

As Bill indicated, I'm one of four generations of Texas ranchers in my family. We've tried to combine ranching with public service. My father took time from the ranch to help conceive, establish, and conduct the soil erosion service which became the Soil Conservation Service, and served as the Regional Director for the first 20 years of its life and mine. I grew up with some of the people who recognized farm and ranch conservation problems, developed a new technology and applied it then and now. The early conception was that the Government should do the job. But even with CCC labor and the valiant effort mounted with missionary zeal, those in charge soon realized that the job was too enormous for anyone but the landowners and operators themselves to accomplish. Those farmers and ranchers had the desire, ability, and economic incentive to do a better job for themselves, their families, and their communities. But they lacked the technological knowledge to get the job done.

Soil Conservation Districts were created to provide landowners, at their request, technical assistance from the Soil Conservation Service. Some of you have heard me say before, that system is based on the sound principle espoused by Abraham Lincoln that the Government should do for the people only that which needs to be done in the public interest that the people cannot do for themselves. It has served the privately owned lands of the United States well. Coordinated conservation plans were devised with operator and technician each contributing his own expertise. Practices were first applied

encouragement in later years coming from cost-sharing through ASCS and Great Plains conservation programs. Begun in desperation, conservation management has burgeoned in recent years out of economic necessity. Costs and returns have done more for conservation than all the teaching and preaching ever did. There is no substitute for individual stewardship and economic incentive to stir effective action. Winston Churchill, among others, has said, "those who failed to study history, are doomed to live it over." The Greeks said it first, and it's still true.

In the early 1970's, a new generation, in and out of Government, rediscovered conservation and the environment as a cause and dedicated themselves to the proposition that only massive Government intervention could save the country from the impending disaster of environmental degradation. First, second, and third level administrators of Departments and Agencies were delighted, and still are, to respond to this public outcry for their services, and acted vigorously to assist in drafting a proliferation of legislation which hopefully would enlarge their responsibility, funding, and staffing. To the dismay of all, there has been too much legislation and responsibility with not enough funding and staffing to the point that the original mission of conservation on the ground has suffered, and new programs and procedures are subsiding under their own weight.

The original and effective policy of a highly qualified field force of working technicians, backed by the minimum number of staff and administrators, whose primary purpose was to facilitate the field staff, has given way to a relatively few overworked field people, distracted by more programs, procedures, meetings, studies, and assessments than the alphabet can provide acronyms for, while available funds are diverted to new tiers of administrative personnel. When do we relearn the hard lesson that only the partnership of operator and technician on the ground they know so well, and using their full knowledge and experience, can respond to a dynamic ecosystem and get the continuing conservation job done on both private and public lands with minimum expense? RPA and RCA, along with FLPMA, are investing millions of dollars and thousands of man-hours in inventories not accurate enough to use on the ground, nor for making major policy deci-

puterization. At the same time, the technicians cannot find enough time to serve the lands and people to whom each agency is basically responsible. None of us, individual or agency, ever has enough time or money. Our success or failure then depends primarily on the priorities we set for using available resources. Having lost sight of the goal, we're only redoubling our efforts and multiplying the problem. The capability of technicians has suffered. Agency veterans are suffering from a lack of time to increase what they know and to apply what they've learned. Frequent moves may, in some cases, be beneficial to the agency or to the technician personally, but lessen productivity if the technician is not in one place long enough to learn the country and the people well enough to interact effectively with both. He drives up to the ranch house in a Government pickup only to be graciously dismissed when the rancher learns he lacks the experience to apply what he knows.

Under the guise of equal opportunity, we place a bright young person in a situation where he cannot be successful, so that his only escape is to hide busily in an office behind a stack of papers to avoid being weighed and found wanting. We should not be prejudiced, but each of us earns his compensation by making discriminating decisions. Surely, with concerted input from all concerned, Civil Service could restore working experience as a valid plus in hiring.

Perhaps worst of all is the number of nonrange trained personnel called upon to make range management decisions and judgments. This frightful situation occurs from top to bottom of each agency and usually is done of confidence born of ignorance. The more you know, the more you know you don't know. The more fruitful kind of confidence is born of competence in what one does know, and the integrity to say "I don't know" when necessary and to refer to someone who does.

You might wonder why I, as one who operates on privately owned land, would not want grazing stopped on public lands to reduce the supply of red meat and improve my competitive position. The reason is that as a professional rangeman, I know that most rangelands can be improved more rapidly with proper grazing use by domestic livestock than without it. And that usually livestock grazing not only is compatible, but complementary to wildlife production. Comparison of livestock enclosures to properly grazing pastures, in several instances in Texas and New Mexico and probably other places, shows faster improvement outside the enclosures.

Proponents of no management, whether they realize it or not, should compare productivity and health of timber and wildlife in Forest Service administered lands with those of the National Park Service. The contrast is striking. Often, too much emphasis has been placed on numbers of wildlife, which if excessive, can result in unthrifty animals rather than smaller numbers of healthy robust animals more desirable for esthetics and hunting and balanced to the habitat available. Contrary to the view of some, most ranchers I know enjoy and appreciate wildlife in a very special way from daily contact

where there is an economic incentive exists, and will go to great lengths to improve habitats. Income from hunting on Texas ranges has produced annual income of \$1 to \$5 per acre, and is especially welcome in times of low livestock prices.

From my own experience on private lands in which there's no one to direct stocking rates and management practices, I know that each year varies in production and, therefore, stocking capacity, so I have to plan herd reductions or additions that won't wreck my breeding program or tax management, and vary the rotation grazing systems as required to accommodate changing situations. I sense a reluctance on the part of public land grazers to reduce numbers in time of lower forage production—perhaps, just because the Government said to, or for fear that numbers will not be increased again when forage increases. Although I'm a strong believer in and user of rotation grazing systems, I share their concern at being forced into one that may not be compatible with their livestock operation or provide flexibility to make needed adjustments. And I would pause to say, parenthetically, that the concept of best management practices frightens me. A management plan should be custom-tailored to an individual situation like a suit. You don't buy a suit off the rack and wear it with the expectation that it will fit as well or be as comfortable and becoming as a custom-made suit.

I hope that we don't depart from that custom tailoring concept to very specific ecosystems. These concerns can be overcome by careful planning and full communication between the knowledgeable operator and the knowledgeable technician in order to take advantage of rotation and other benefits where adaptable. Further, I see no reason that operators should not be able to pay for all or part of range improvements on public lands with permits granted long enough to amortize and recover their investments. This practice is not uncommon on private lands and other non-Federal lands, and contributes to more and faster range improvements.

There are some really good things happening in rangeland management. The Society for Range Management has asserted its rightful leadership role in initiating an interagency committee now working to develop common terminology and methodology for rangeland inventory, which will facilitate the correlation and communication of information and implementation of management plans where more than one agency is involved. Such a system would bring sighs of relief from technicians and operators who must integrate multiple ownerships in one coordinated plan. The Society also provided input and impetus to a proposed cooperative rangeland research act which was introduced in the last Congress by Mr. Poage and which will be reintroduced in the next with the backing of the National Cattlemen's Association, and, hopefully, other groups as they become aware of this opportunity.

And finally, range livestock operators who survived recent years of increasing costs are the most competent, sound, and efficiency-oriented of any before them. More and more, they will be challenging university and agency personnel with requests for information and

to produce food and fiber for our own country and the rest of the world. Can we meet that challenge? We sure-

ly can if we have the right perspective, principles, priorities, policies, and most of all, people.

OPPORTUNITIES TO IMPROVE RANGELANDS

By

J. W. Swan

First Vice-President, Idaho Cattlemen's Association

Before I address myself to the assigned subject, I would like to make a brief statement in regard to the Bureau of Land Management and the Forest Service. I hear too many people, especially from the environmental community, criticizing the BLM and the Forest Service for their management of the public rangelands. These self-appointed critics do not know nor have they bothered to find out how bad conditions actually were on much of our range.

In 1934 with the blessing of the Livestock Industry, Congress passed the Taylor Grazing Act, and some management was brought onto the public ranges. Anyone who does not agree ranges are in better condition today than they were then, is either very young or very uninformed. I think the time has come when we should stop criticizing the actions of these BLM people.

I was sitting by Bill Mathews, State director of Idaho yesterday, and I heard one of the speakers say how the Bureau had allowed this land to continue to deteriorate. You're saying to these people who have dedicated a lifetime to helping manage and revitalize these ranges "that they have been a complete failure" and everything they have done is "down the tube" and now we are starting again.

Nothing could be farther from the truth.

True—these people may have been lacking in funds; maybe they lacked staff; maybe they lacked expertise; sometimes the management had to be custodial, but by and large they did a damn good job and their contribution should be recognized. I get sick and tired of hearing them castigated.

My remarks are going to be, I hope, from a practical point of view those of a rancher engaged in trying to make a living. I've often thought when we speak of domestic livestock grazing on rangelands that we were using a misnomer. Instead of saying livestock grazing we should say food-producing. I think people should realize that when they recommend a reduction, they are not reducing domestic livestock grazing, but they are reducing food supply for the world. These same people may go to the world food conference and say, "Hey, we've got to produce more food to feed this hungry world." Yet, these people may be in the forefront in the movement to remove livestock from the public range-

There are many ways to improve rangelands. It is my opinion that we must always look to the effect of any particular practice on our basic resource, the soil. Unfortunately, many of our rangelands have been overgrazed by both domestic livestock and wildlife, resulting in soil erosion and loss of fertility. Our goal should be to restore these soils to their full productivity. Where soil erosion has been light and there is an abundance of top soil, we can expect a rapid improvement. Where there is little top soil left, it may take hundreds of years. The most important step is to stabilize the soil and vegetation and start it on an upward trend.

I have heard several speakers talk about increased forage and habitat for wildlife or domestic livestock. I believe that grazing by either wildlife or domestic livestock must be a spin-off of proper range management, and that soil and water protection must be our number one priority.

I think there are two main reasons for the continued grazing of domestic livestock on our rangelands. First, we must use this renewable resource produced on our rangelands for the production of food. Every AUM produced from range releases the equivalent of 8 bushels of corn for human use. On the average, about 1 percent of sunlight energy falling on the earth is captured by vegetation. On rangelands, the ruminant animal, both domestic and wild, through its ability to convert roughage into edible meat, is the primary means of making productive use of these areas. Food production, with less use of fossil fuel and fertilizers, is one of our greatest challenges if we are to feed our ever increasing hungry world.

Second, it has been soundly documented by range professionals that domestic livestock properly managed is one of the best tools that we have to restore our ranges.

Probably the most important method of improving ranges is management. We must learn to satisfy the biological needs of the plant community that we are managing. Periodic rest, season of use, intensity of use, are all important in devising a grazing system. Seldom has reduction of livestock to so-called "proper levels" resulted in improved range conditions. The best lands, the most productive deep soil areas, such as meadows,

or not at all. Those who advocate reduction as the sole solution do not understand the grazing habits of livestock. Reduction without management accomplishes nothing.

There are many grazing systems and modifications of grazing systems that are acceptable. Almost every allotment or ranch is a different unit and must be treated differently.

On our ranch we use rest-rotation as our basic system and we feel that it works for us; but to advocate that rest-rotation should be imposed upon every ranch is unrealistic.

I hope that from this symposium and others that might follow, we can develop policies for the use of many other methods of range improvements. Among them are:

1. Use of Herbicides

This certainly has to be considered in many areas. It has many advantages in sagebrush areas. The dead brush protects the area and adds humus to the soil, and stops the blowing snow. Some disadvantages are cost, and destruction of some browse species and forbs. I think we need to develop a policy as to where and when we can use herbicides and which of them are acceptable. Properly used, they are a good management tool.

2. Controlled Burning

It can be done cheaper, and seems to have a fertilizer effect on the grasses. In our area it should have at least two full growing seasons of rest and protection.

3. Reseeding

There has been much criticism of crested wheat and its so-called resulting monocultures, to the point that crested wheat is considered "exotic." However, as Dr. Cutler pointed out yesterday, many of the grasses of the future may come from Russia or Mainland China. Often small acreages of crested wheat can provide enough early season grazing to allow rehabilitation of other depleted rangelands.

4. Riparian Zones

One of the most pressing problems we have is management of our riparian zones. I think many of you attended the symposium by Trout Unlimited in Denver on "Riparian Habitat." It was a pre-determined symposium. They had agreed that grazing by domestic livestock was the sole reason for the degradation of the riparian zone. That conclusion had been reached before we came to Denver to appear on the panel. It seemed the only thing we were to decide was "how high they were going to hang us." Little effort had been made to study these riparian zones, and they seemed to come to the conclusion that there were only two things that could happen. One was season-long use with no management. The other was complete exclusion. This is not acceptable to the livestock industry. These are some of the most productive areas we have.

At our ranch we feel that our rest-rotation system is

to protect these areas. Apparently little has been done in research to solve this problem.

5. Research

Last year I attended a conference on "Research on Forests and Associated Rangelands" conducted by the Forest Service. It said "Forests (and in small print) and Associated Rangelands." Now believe me, they did not get "and Associated Rangelands" small enough, because after you've heard of nothing but trees for a week with little or no attention paid to the research needed on rangelands, you find that in the scheme of things we don't stand too high. Certainly we've got to insist that the budgets for research into such things as the management of our riparian habitats, the effects of controlled burning, the use of herbicides, development of new grasses that might have greater production along with increased nutrition and palatability, must be increased. We need a tremendous amount of research if these rangelands are to produce to their potential.

6. Private Money

The use of private money, that John referred to, to implement range improvements should be encouraged. Given the proper "climate," much can be done without relying on Federal funds. Certainly there are adequate safeguards in every law that has been written that says, "In no way shall this create a vested-interest in the permittee." I know many of us have spent thousands of dollars in improvements on the public lands which we immediately turn over to the Government. Then we sign an agreement to maintain them. Much more work could be done given the proper climate, and the proper security that we will be on that land long enough to at least reclaim part of our investment.

Unfortunately, many people who are not range scientists have become involved in making decisions involving range. The scientist has given way to the lawyer, the judge and the environmentalist. Many simplistic terms have been developed. For example, we speak of "proper use." How could you be against "proper use"? Certainly it implies that if you are against proper use, you are for *improper* use. Yet, it is my understanding that proper use comes from an old soil conservation term, or a system devised in areas of season-long grazing where the forage was going to be defoliated to a certain percent every year. Yet we hear people using "proper use" in deferred grazing and rest rotation systems where that concept no longer is applicable.

Allocation of forage. What could be easier? We go out, we "throw the hoop," we measure the amount of forage we have. We get out the computer, and we allocate it. That would be very simple if forage grew that way, and if livestock and wildlife grazed that way. Unfortunately, the only thing we can control in this whole forage allocation process is domestic livestock. You can build a marvelous "hotel" for wildlife, but if they've decided they don't want to come, you've allocated for nothing.

We must recognize that forage production may vary

is based on vigor of the plant, the amount of moisture, especially during the growing season, the season of use, temperature, and many other factors. How then can we "allocate" when the only absolute control we have is domestic livestock? We cannot control wildlife, wild horses, or production.

Forage inventory is very important, but only as one factor in determining range trend and condition. Certainly it cannot be the sole basis upon which decisions are based to establish stocking rates. I don't think that this will stand the challenge of the scientific community, or the courts. Historic use, by both domestic livestock and wildlife, must be considered. Trend is more important than condition.

Allocation as an exact measurement for either production or consumption is, at best, an approximation and should be viewed in that light.

Many of the speakers tend to view the public lands as if they were a separate eco-system with little or no relationship to private lands that join or intermingle with them. Much of the critical habitat for wildlife is found on our private lands. Most of us have accepted this and, historically, have furnished this forage for wildlife. But

now we are being told that we must keep our own domestic livestock off that part of the public land that is considered critical for wildlife. Don't expect us to accept this. Don't force us to manage our private lands to the exclusion of wildlife. When the pioneers settled the West, they naturally picked the best land with the most water for their farms and ranches. This still furnishes much of the forage for both domestic livestock, wildlife, and fisheries. If we are forced from the public lands, we have two alternatives. First, we can manage our lands for domestic livestock only, or, secondly, we can sell to the "developers." None of us want this, so please don't force us into it.

Although many of the groups in the conservation movement opposed the Rangeland Bill, and even intervened at the White House to obtain a veto, we cattlemen are willing to let bygones be bygones. We have suggested to the Department that we would be willing to join with them and other interested groups in presenting a united front in obtaining the funding authorized in the bill. We think it is necessary that a precedent be set that we expect the appropriation to be made as authorized so that we might get on with the program of rehabilitating some of these rangelands.

OPPORTUNITIES TO IMPROVE RANGELANDS ECONOMIC INCENTIVES, COSTS AND BENEFITS

By

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Management of rangelands to improve their productivity has consisted of three major techniques. They are grazing adjustments and systems, vegetative manipulation, and range structures. Examples of grazing adjustments and systems include rates of grazing, season of grazing, and rotation grazing. Examples of vegetative manipulation are artificial reseeding and brush control. Examples of range structures are water developments and fencing. The major problems that tend to inhibit improvement of rangelands are partly biological, partly economic, and partly social. The latter two problems will be stressed in this paper.

The economic problems consist mainly of measuring the benefits and costs of improvement practices in meaningful economic terms. If a well is drilled for better distribution of livestock on a range, how many more pounds of marketable cattle can be produced over the life of the improvement? Will fencing provide a larger return? What will be the savings in costs, such as labor for alternative developments? What will be the increased costs? And will the better distribution result in an improved market value of the resource? What discount rate should be used for the improvement and what will be the economic (rather than tax) life of the improvement?

The social problems are even more complex than the economic ones. One of the social problems is incidence. Who will share in the benefits as well as the costs of im-

proving rangeland and to what degree of each? Ranchers seldom have multiple-use goals in their management of range resources. Public land administrators seldom have anything other than multiple-use goals. If public and private lands intermingle, the economic goals of ranchers, usually with a relatively short time horizon of 3 to 20 years, may conflict with the socioeconomic goals of public land administrators, invariably with extremely long time horizons. How much will the local economy benefit and how much will society as a whole benefit? What local services will be affected and by how much? To the extent that they depend on income and income distribution, social stabilities of local communities will be affected by the answers to these questions.

Financial Status Review

Most of this section will be taken from preliminary data of a study of the organization, investments, costs and returns of cattle ranching in the southern Great Plains area of northeastern New Mexico. This study was chosen because it offered a continuous description of ranch finances over a 13-year period, 1965 through 1977. Further, three sizes of cow-calf ranches were included. One of the national grasslands is included in the study area.

The investment data for cow-calf ranches for 1977 are as follows:

<i>Ranch Size</i>	<i>Animal Units per Ranch</i>	<i>Total Investment per Ranch</i>	<i>Investment per A. U.</i>	<i>Proportion in Range Improvements</i>
Small	68	\$ 341,400	\$5,020	6.3 percent
Medium	240	977,100	4,070	8.3 percent
Large	500	2,314,400	4,630	5.3 percent

The equity, debt and debt-asset percentages for 1977 are as follows:

<i>Ranch Size</i>	<i>Owned Investment per Ranch</i>	<i>Total Debt per Ranch</i>	<i>Debt as a Percent of Assets</i>
Small	\$ 256,150	\$ 54,800	21 percent
Medium	874,680	90,510	10 percent

Net incomes per ranch, or amounts available for returns to operator labor and management as well as capital in 1977 were:

<i>Ranch Size</i>	<i>Total Receipts per Ranch</i>	<i>Total Costs per Ranch</i>	<i>Net Income per Ranch</i>
Small	\$ 7,945	\$13,925	\$-5,980

and the index of annual precipitation. For medium-size ranches, prices, precipitation and net incomes were:

<i>Year</i>	<i>Steer Calf Price per Cwt.</i>	<i>Index if Annual Precipitation</i>	<i>Net Income per Ranch</i>
1965	\$23.56	100	\$ 6,510
1966	27.09	74	3,770
1967	27.09	84	6,240
1968	28.98	62	3,175
1969	32.28	123	8,880
1970	34.16	61	8,785
1971	37.93	89	7,610
1972	44.76	107	18,070
1973	57.25	77	20,215
1974	31.81	76	-2,130
1975	28.03	65	-7,140
1976	33.20	76	-8,250
1977	39.44	77	-8,460

Significantly, prices in 1977 were higher than in 1970 and 1971, while the index of precipitation was higher in 1971 and lower in 1970. One would expect net incomes to be about the same in these two time periods. Actually, net incomes were about \$8,200 in 1970-71, and a loss of about the same amount in 1977. The change demonstrates the impact of the cost-price squeeze which has been particularly serious on ranches since 1973.

In summary, ranches are carrying a heavy burden of debt in total dollars, but relatively light burdens in terms of total and owned investment. The investment per animal unit is astronomical and bears no relationships to income regardless of ranch size. Net incomes were negative in 1977 on all three sizes of ranches. Relatively unfavorable prices and precipitation levels since 1973 have combined to yield negative returns for 4 consecutive years during which time costs per ranch have increased sharply. Ranchers probably have enough debt-free assets or equity to permit borrowing to improve

Kind of Improvement

Brush Control
Artificial Reseeding
Range Fertilization
Rotation or Deferred Grazing
Plastic Pipelines
Suspension Fencing
Electric Fencing
Irrigated Pastures
Ranch or Range Analysis
Livestock Crossbreeding Programs

It is fairly obvious from this information that ranchers do not adopt new technologies very rapidly, and that livestock improvement programs are much more quickly adopted than range improvement practices. Further, range practices were attempted more frequently in an area with large amounts of public ranges than in an area that is mostly private- and State-owned rangeland. An earlier study in 1970 of an area extending from west Texas to Tucson reported substantially higher percentages than the above, particularly for plastic pipelines, rotation and deferred grazing, and brush control.

Range Improvement Status

Changes in values of range improvements can be an indication of future values and prices. Data for a few range improvements indicate the following changes in investment values, as follows:

<i>Kind of Structure</i>	<i>Unit</i>	<i>1965 Value</i>	<i>1977 Value</i>	<i>Percent Change</i>
Corrals	ea.	\$ 900	\$2,700	+ 200%
Wells	ea.	1,000	2,820	+ 182
Pipelines, plastic	mi.	750	2,500	+ 233
Tanks, dirt	ea.	300	1,360	+ 353
Fences	mi.	270	700	+ 159

The values reported above are about 50 percent of current market prices in 1965 and 1977 for new improvements.

Another aspect of range improvements is the change in numbers of improvements per ranch over a 13-year period. Data for a medium-size ranch indicate the following:

<i>Kind of Structure</i>	<i>Unit</i>	<i>1965 Quantity per Ranch</i>	<i>1977 Quantity per Ranch</i>	<i>Percent Change</i>
Corrals	ea.	2	2	0%
Wells	ea.	6	8	+ 33
Pipelines	mi.	0.5	4	+ 700
Tanks	ea.	3	14	+ 367
Fences	mi.	18	21	+ 17

Water developments continued to be the more popular choice of ranchers making major range improvements.

A survey in 1973 and 1974 indicated that the percentages of ranches in northeastern and northwestern New Mexico attempted the following kinds of improvements at some time on the ranches they operated:

Northeastern N. M. Ranches

29 percent
16 percent
0 percent
32 percent
20 percent
0 percent
13 percent
6 percent
23 percent
55 percent

Northwestern N. M. Ranches

32 percent
33 percent
3 percent
59 percent
54 percent
11 percent
3 percent
35 percent
32 percent
90 percent

Future Opportunities and Policies

The key to improving rangelands in the future lies in a careful appraisal of benefits and benefit recipients. It is probable that the financial status of ranchers will be much improved over the next 2 years, with prices received gaining faster than prices paid. A depressing factor will be the increasingly burdensome interest and principal payments to be experienced by most ranchers. Currently, these payments alone are about a third of total operating costs on ranches. If ranchers were to

receive a price that would pay for all capital used in range livestock production (including debt interest payments), a return to operator labor and management, and all operating costs, the 1977 price would be, on a medium-size ranch in northeastern New Mexico, about \$1.40 per pound of calf, rather than the \$0.39 per pound actually received.

From one viewpoint, the range livestock industry should take credit for subsidizing the American consumer by about \$1.00 per pound of cattle marketed. Cattle ranchers have refused to accept direct subsidies in the past except for drought emergency subsidy programs. Sheep ranchers have accepted a direct subsidy for one of their products—wool. Both groups have readily accepted indirect subsidies, mainly meat import quotas and cost-sharing on range improvements. Proposed Federal policy on the latter is to limit future Agricultural Conservation Program payments to conservation practices and eliminate payments that would merely increase production. This policy would seem to be contrary to the long-term goals of improved rangeland. (Partially counteracting this loss on private lands is the new Public Rangeland Improvement Act of 1978.)

Efforts to increase production when the grazing rate is at or near capacity will have a negative impact on conservation of resources unless the capacity can be increased. Cost-share payments to increase grazing capacities is a conservation practice. Further, this kind of cost sharing may reduce the rate of subsidy to the American consumer without necessarily reducing the total amount of the subsidy received by the American consumer.

The socioeconomic impacts of improving rangelands should be measured in terms of multipliers—output, income and employment. Type I output multipliers for the range livestock industry in the Southwest average about 1.8 to 2.0, while a few reports indicate that Type I income multipliers are 2.5 to 3.0. That is, for every \$1.00 of output generated in the range livestock industry, the local economy experiences an increase of \$1.80 to \$2.00 of economic activity; or for every \$1.00 of income generated by the range livestock industry, the local economy experiences an increase of \$2.50 to \$3.00 in total household incomes. Obviously, if household incomes in the range livestock industry decline, either because of deteriorating rangeland or adverse public policy, a threefold adverse impact may occur in the local economy unless incomes in other sectors are stimulated (by public policy).

With increased or decreased incomes, a wide variety of local services can be expanded or must be curtailed. Only in recent years have State and Federal policy-

makers considered impacts beyond those associated directly with the natural resource itself. A recent example has been the RARE II program, in which local impacts were included as a criterion for selection, albeit somewhat vaguely and incompletely in terms of employment changes, a relatively unimportant factor in range livestock production.

Multiple uses of public lands, and increasing land use planning that favors multiple uses on private lands, spread the incidence of benefits from the land owner to various societal groups. Costs are not as well distributed as benefits. Those engaged in timber harvest and grazing on public lands are subject to fees that are related to the fees charged on private lands. In contrast, recreational users are charged a nominal fee or are permitted free use. Groups engaged in hunting or fishing have unique characteristics. Fees are paid to the owners of the game and fish (the States) on Federal lands, and may be paid to the owners of the land on private lands. The biological tradeoffs among, for example, wildlife grazing, range livestock grazing, water production, and non-consumptive as well as consumptive recreational uses, are not well understood. Without reliable tradeoff data, cost effectiveness analysis of practices to improve rangelands cannot be measured without corresponding benefits, particularly in the private sector.

In the past, environmental goals occasionally have conflicted with goals to improve rangeland, particularly in the uses of chemicals to control undesirable plant species, and some construction activities such as dams and fences. Recent positions of environmentalists and ranchers indicate both favor improved rangelands, although some variances still exist as to method and beneficiaries. In the future, less controversy is expected based on attitudes of both groups regarding methods of improving rangelands. Close agreement is anticipated on the overall goals of improvement practices. Less agreement is anticipated on the division of benefits from range improvements, particularly on public lands.

Economic models have been designed that would permit acceptable analyses of the feasibilities of improving rangelands, including benefit-cost models, internal rate of return models, applications of marginality concepts, and various kinds of business accounting techniques. Less well developed are social impact models dealing with community identification, stress, well-being and stability. If the biological tradeoffs were available, economic analyses could effectively utilize the discovered relationships to help reduce the lag in adopting that portion of technological developments that apply to improving rangelands. No doubt, social analyses would not be far behind.

AMERICA'S RANGELANDS OPPORTUNITIES VS. CONSTRAINTS IN OBTAINING BENEFITS

By

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Western rangelands have become increasingly significant to the Nation because they may be the last vestige of large areas of publicly owned lands that are subject to the demands of the people. The numerous laws, regulations, policies, acts and agencies involved in managing these resources are often viewed as being relatively uncoordinated. Their efforts to protect rangelands without being able to define priorities, or the limits of their control and management, is a problem of regional and national concern. In the West, it long has been recognized that the rangelands that occupy about three-fourths of the land area of the Nation also are the wealth of the communities and the States as well as the Nation when they are properly managed.

World Food Challenge

Conversely to these values, periodic shortfalls in world food production have brought to the forefront the very fact that these lands are indispensable as a source of red meat to this Nation and the world. Because range and pasture lands provide the major portion of the feed for livestock production in the West, it is often forgotten that these lands also provide a basic substitution for total nutrients which the animals consume in meeting the red meat requirements of a Nation. Highly productive farmlands must be used for basic foods that the world's population needs. Therefore the rangelands of the West become a substitute for grain, corn, and other crops produced in the more humid regions of America.

Environmental Impacts

The increasing demand by environmentally interested groups for replacement of land management systems evolved over years of experience. New schemes built upon concepts rather than facts continue to create problems. Ramifications extend far beyond the initial intent of the populace seeking a greater voice in the use of public lands.

With the recognition that 13 years or more will be re-

approach often has been taken when site specific information does not exist. The application of theory where proof is limited or nonexistent has made the process and plan less than acceptable to all constituents. The role of the Federal, State and private individuals in making it possible to maintain and develop a lasting resource basically requires a new dimension of agency cooperation which recognizes that lands have had a history of management and use.

Evaluate Management

Therefore, the first step in developing a creditable plan is to review, understand and consider the advantages and limitations of current management systems. Adjustments and improvements are built through cooperation rather than an authoritarian, antagonistic approach. Theorists as well as ranchers may well find that a book of ecology is only one source of information, and that much may be learned by approaching a problem with an open mind.

History is an excellent teacher in proving to us that writings and reports often are colored by myopic observations of what should be present rather than what actually exists. To assume that ecological theory, at its best, has no exception and, at its worst, has no place, is to assume that all concepts must be applied to all locations. There is no substitute for judgment in applying new concepts to old problems.

By combining the talents of the Federal, State and local populace, it is possible to find common areas of agreement, and sort out those areas of disagreement to be addressed through individual study, or purposeful dialogue. The Western States long have realized that a fence line may identify ownership of Federal vs. private lands, but it does not change the overall common problems of land management. The watershed is not restricted by ownership boundaries nor is the impact of the recreationist, wildlife, or other users limited by a public land permit.

Management of domestic livestock on Federal prop-

rangeland forage as 4 miles or less from water, and a 26.5° or less slope, is a bureaucratic dream not supported by fact. Federal lands have been used for a long time in concert with private properties, and contribute to a balanced livestock enterprise. Removing any portion quickly places the entire operation in jeopardy. Plans built upon faulty assumptions, regardless of how laudable in purpose, invite a challenge of creditability.

Private Investment

The encouragement of private and public investors on Federal lands must be recognized as a partnership and viewed much as a corporate effort, where all of the partners could contribute to the success of the whole enterprise. Rangeland areas must be managed with an understanding of the total resource. Management decisions cannot succeed when built upon political pressures or on recently found public interests that may prevail at a moment in time.

The normal process of obtaining returns on an investment must be recognized as a requirement when private enterprise invests in long-term improvements that are of benefit to the public as well as the private user. Of key importance should be an incentive system of tax credits that encourages the private sector to invest in the public lands. Capitalization of investment through a tax system, much as is followed in any other area of business in America, is a logical possibility. To do less than this is to encourage private land users to invest for the public good without the opportunity to gain a fair return.

The constraints to the investment of desirable land improvements usually relate to the permanency of the occupant who is expected to make the investment. Economic returns in the past have been possible through established values of animal unit months identified on permits that were a part of a balanced ranch operation. The land use permit must continue to be part of a total 12-month feed budget where Federal lands make up a significant part of the total rangeland.

Nevada and Public Lands

Public concerns for Federal lands can be summarized as wanting to maintain, for posterity, a resource that our children's children can still view as being of key importance to the social structure of America. To place this into appropriate perspective, consider Nevada as an example of how the social concerns of a State may not necessarily be consistent with the social concerns of those beyond the State boundaries, yet each has a primary goal of the perpetual maintenance of land resources for future generations. With 78 percent of lands in 100,000 square miles being owned by the Federal Government, it is obvious that management's goals of those who read about the resources but do not live in the region can be significantly different from

Impact of Land Change

More specifically, the possible reduction of 30 to 50 percent of all permitted livestock, because of environmental concerns, forces one to look at the disruption beyond the home and industry to such community concerns as school and property tax base, business climate, and the very economic viability on an established social structure. Withdrawal of Federal rangeland that is now part of the economic fabric of a State must be viewed in the same context as expanded Federal programs of land ownership such as is faced by the U.S. Department of Defense.

Experience has shown that without Federal subventions, the changed use of lands by the United States Government fosters disruption and decay of small communities. Of the 860 ranch operations in the State, using Federal lands for grazing, many are willing and eager to participate in adjustments of their operations, but none are willing to be a partner in a dismantling process.

The impact of the reduction of 100,000 head of cattle that now use Bureau of Land Management lands is much more than the potential loss in red meat production after feedlot finishing—nearly 100 million pounds per year. This is only a part of the disruption since many of the ranch units would not be economically feasible and would be forced out of business. The loss would be a catastrophe.

Room for Adjustment

Since the disruption basically addresses itself to forage and land availability, it is logical that, in a State with 49 million acres of Bureau of Land Management lands, and about 1-1/2 million acre-feet of unadjudicated groundwater, there is room for compromise. The national interest of feeding a hungry world does little to support those who would demand that this land potential be ignored and that pristine conditions are the ideal goal. The laws are on the books, the regulations are manageable, and the problems could be solved if everyone had the inclination to do so.

Economic studies by the University of Nevada show that the recently reopened Desert Land Entry Act, coupled with the use of Public Law 95-514, could not only resolve continuing disputes concerning domestic livestock use of Bureau of Land Management lands, but could also make a very positive impact on the State's economy. Projected pump irrigation development of suitable lands in conjunction with existing ranch operations shows the potential of returning the average ranch a profit. In addition, seasonal pressures on questioned grazing allotments could be removed, achieving the goals as set forth in the required environmental analysis. Above all, it would be recognized that the Federal agency and the individual have a continuing responsibility. Once regulations are promulgated and a report is written, the agency must assume a responsibility to mitigate the problems and not leave the operator to his own devices.

An overall attempt must be made to use the environmental impact statement system as a working tool. Multiple use of all rangelands is an ideal, not a total

found to apply regulations without a purposeful effort to destroy a partnership that exists in the national interest. The application of regulations in a zealous lock-step fashion will bring discontent, disruption and disagreement. Social and economic impacts will be in direct proportion to the judgment and imagination used by all parties with the Nation, rather than the individual or agency, having the most to lose or gain.

Summary

In summary, the role of the Federal, State and private groups in the development and management of rangelands may be viewed differently, depending upon how the individual or agency is involved. The fence line ownership does not change the topography nor does it reduce the individual parts. The encouragement of private industry to work as a partner with the Federal

agencies through tax incentives and credits similar to those enjoyed by other industries is a concept that could be of key importance to future land management plans.

In Nevada, environmental impact statements may be viewed positively if the agency recognizes its responsibilities. Participation in the forage development of community pastures, site specific improvements and the encouragement of normal partner relationships are essential for success. National, State and community concerns are all related to a common goal of a lasting national resource. The manner in which the different paths emerge in achieving this goal is the basic question. The solution is not simple, but through compromise and sound judgment, it is possible to accommodate the various public interests.

The mandate is clear. The opportunity is present. The variable is man and his understanding of the Nation's rangeland and its place in society.

RANGE OPPORTUNITIES IN THE SOUTH

By

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The potential for range forage production in the South is unexcelled in any other region of comparable size in the United States. The southern range covers about 200 million acres, and includes all or portions of a dozen States extending from Virginia into eastern Texas and Oklahoma. Approximately one-fourth of this area is owned by the public and forest industry, while three-fourths belongs to nonindustrial private landowners. Southwide, more than 28 million acres are in improved pasture, many of which are used to supplement seasonal grazing of native range. In 1970, range forage in the eastern forest was estimated to have potential for increasing livestock production by 147 percent without deterioration or reduction of environmental quality or other resources. At that time less than half the area was grazed.

The term "range" is defined as lands producing native forage for grazing or browsing animal consumption, or lands that are revegetated to provide forage that is managed like native vegetation. Livestock grazing is usually considered the predominant use of range, but nearly always range is shared or exclusively used by wildlife. Southern range is primarily forested land that produces forage in openings or under the trees.

Several developments in the recent past have heightened the importance of forest range. The Multiple-Use Sustained Yield Act, the Resources Planning Act, and the National Forest Management Act require that federally owned forest lands be managed for the production of multiple forest products, including livestock, wildlife, high-quality water, recreation, and timber. Environmental and social pressures have made forest industry and other private owners more aware of multiple-use practices. Multiple-use of forest range can enhance public relations and provide commodities without large expenditures; however, controversies may arise due to potential interactions. For example, forest grazing aids in meeting local or national red meat demands, which benefits both consumers and cattlemen, but improper grazing practices may damage forest regeneration or wildlife habitat.

My paper identifies opportunities and some associated problems in forest range management in the South.

History

Domesticated cattle have grazed the southern forest range since the 16th century when Spanish explorers brought them to Florida. Since that time, cattle have persisted and spread across the South. Numbers have fluctuated from lows during the War between the States to highs near the turn of the present century.

By the early 1930's, most of the old-growth longleaf pine had been harvested and the land virtually abandoned by the lumber companies. As a result, in the lower Coastal Plain millions of acres of prairie-like cutover land became "open range," where annual fires destroyed most attempts at pine regeneration. By the late twenties, however, the Southern States had outlawed forest arson and were attempting to reinforce fire prevention.

After World War II much of the cutover land was acquired by large timber companies and pine regeneration efforts accelerated. More fences, stock laws, stricter trespass enforcement, intensified fire protection, and prescribed burning increased the successful regeneration of many pine stands. Forage decreased under the fast-growing pines and forced a reduction in cattle herds. Today, timber production dominates the management of forested ranges across the South, although vast forage potentials exist.

Forage Potentials

A primary goal in multiple use is to grow high-quality timber and forage for cattle and wildlife on the same acreage. The South has the appropriate climate, soils, water, and light necessary to produce large amounts of both forage and timber. Abundant and uniformly distributed rainfall, desirable for high forage yields, is a characteristic of the South; precipitation varies from 49 to more than 60 inches and is uniformly distributed throughout the year.

Most of the area has at least 7 months between killing frosts, while the coastal areas may be frost free for more than 9 months. Cattle forage is mainly grass with some forbs and browse eaten seasonally. Deer are primarily browsers but also eat herbs, mast, and fruits. Quail,

Three forest-range types make up the most important portions of the southern range livestock environment. These include the longleaf-slash pine, loblolly-shortleaf pine-hardwood, and upland hardwood-bluestem types. Other types include the marsh, prairie, and hardwood bottoms.

The longleaf-slash pine type occupies about 30 million acres along the lower Coastal Plain from South Carolina to East Texas. The area produces more forage per acre than any other forest type in the South. The major forages are bluestem and wiregrass. Other forage plants are panicums, paspalums, native forbs, and occasional shrubs. Periodic prescribed burning is common in the longleaf-slash pine type. Forage yields commonly exceed a ton per acre on cutover or under sparse tree canopies.

About 55 million acres of the loblolly-shortleaf pine-hardwood type are found on the upper Coastal Plain. This type occurs in a belt, about 150 to 300 miles wide, from eastern Texas to northeastern Virginia. Primary plants for livestock are bluestems under open pine stands or in clearcuts, and uniolas where trees are dense. Shrubs and hardwood trees are abundant since fire has been generally restricted. This forest type, which tends to have denser timber stocking than the longleaf-slash pine type, produces less herbage.

The upland hardwood-bluestem type occupies about 46 million acres extending from eastern Oklahoma through parts of Tennessee, Arkansas, Mississippi, and Missouri. Oaks are the primary tree species, with bluestems, Indiangrass, and switchgrass comprising the most important forage plants. Thousands of acres of low-value hardwoods have been converted from brush to grass, which has increased forage production for livestock by as much as 2 tons per acre.

Multiple Use

Cohabitation of timber, livestock, and wildlife on specific land areas may be compatible, beneficial, or detrimental depending on several factors. Naturally, when adverse interactions among uses occur, controversies arise. Foremost is the controversy regarding the use of southern forests as range for livestock. Two areas of particular interest are (1) competition for food between cattle and deer and (2) detrimental effects of cattle on pine regeneration. Much of the controversy occurs because management lacks information on the various interrelationships, or resource managers do not have access to the available information.

Timber production in the South is and will remain the primary objective in forest land management. Consequently, the "burden of proof" for acceptable multiple uses generally lies with the nontimber resource advocates. Some information on multiple uses and their interrelationships already exists. For instance, uncontrolled livestock may concentrate and graze or trample pine regeneration. However, damage can be reduced or eliminated through management techniques such as prescribed rotational burning, fencing, livestock supplementation, and grazing intensities. Damage can also be reduced by balancing animal populations with forage

as copper carbonate, tetramethylthiuram (TMTD), or zinc dimethyldithiocarbamate cyclohexylamine (ZAC) help, but have not been completely successful. On the other hand, some tree benefits may accrue through a multiple-use management program where grazing reduces competition prior to pine regeneration.

Undesirable competition exists where livestock and/or wildlife (mainly big game) exceed the food supplies. Overuse by livestock for long periods is detrimental to plant composition and yield, and can deteriorate soil and site conditions. Excessive use by big game will also change vegetation conditions, as well as cause damage to nearby agricultural crops.

Livestock and wildlife programs can be mutually beneficial. For instance, livestock grazing can benefit wildlife by stimulating new browse growth or opening trails through dense brush. Range livestock management usually provides water developments and supplemental feed, which are used by wildlife in times of need. Conversely, hunting leases can provide an additional source of revenue for the forest landowner. Recreational use of forests is another one of the multiple uses enjoyed by many southerners. These multiple uses, when properly managed, also foster good public relations in the local community.

Trees have both beneficial and detrimental impacts on the range resource. Overstory density, or canopy, is the most influential factor determining forage yields. On the other hand, forage nutrients such as protein increase under shade. Trees provide the essential vertical structure and other habitat features for many wildlife species, especially nongame birds. They also provide browse, shade, shelters, and cover for livestock and wildlife.

Forest and Range Management

Forest management is an important factor for reaching range opportunity potentials. Forage supplies generally provide an index to livestock or wildlife capacities; also important is the vegetation which provides cover. Forage yields decrease as tree stocking increases. Thus, to efficiently balance timber and forage needs, land managers must practice methods that benefit both. Some of these practices include timber site preparation, reforestation, timber stand improvement, thinning, clearcutting, fertilization, prescribed burning, and range livestock management. Surface water drainage in the lower Coastal Plain can also improve forage production.

Site Preparation

After timber stands are harvested, cutover sites are prepared to eliminate or reduce unwanted vegetation that inhibit survival and early height growth of planted pines. Site preparation varies from a little to complete tillage. Nothing more than a prescribed burn may be necessary to direct seed or plant relatively open cutover longleaf pine stands or clearcut old-field pine stands. By contrast, intensive preparation such as chopping, shearing, windrowing, and hedding may be needed in

understories. Intensive grazing prior to regeneration can substitute for site preparation in some cases. After initial disturbance, site prepared areas usually have increased forage yields through the removal of the overstory and midstory. However, seeding of introduced or native species on site prepared areas can provide better forages than natural succession. When grazing site prepared areas, care must be taken to prevent cattle concentration and eventual damage to trees.

Reforestation

Reforestation practices influence the forage available for wildlife and livestock. Because crown closure is delayed, wide spacings such as 10 × 12 feet or 12 × 12 are more favorable for forage production than closer spacings. Dense direct-seeded or naturally regenerated stands usually reduce forage production sooner than planted stands. The wider spacings in plantations provide additional time when good grazing is available. Forage supplies are greatly diminished by age 5 years in closely spaced tree stands, where wider spacings will provide forage to about age 10 years.

Thinning and Harvesting

Timber removal benefits forage for livestock and wildlife. Precommercial thinning of dense, direct-seeded slash pine stands can increase forage by four times. A similar relationship probably holds for naturally regenerated slash and loblolly pine stands. Commercial thinning is also beneficial since it opens the canopy and allows more light to reach the forest floor. Where longleaf pine stands are regularly thinned and prescribe burned, they produce about half as much forage as treeless range.

Timber stand improvement (TSI) in upland hardwood and loblolly-shortleaf pine-hardwood types has similar results on forage as thinning. This cultural practice opens up stands through removal of cull trees and weed species, and increases herbage and shrub yields.

On industry and National Forest pine lands, clear-cutting is generally followed within a year or two by site preparation and planting. A common policy in National Forest management is to clearcut areas of less than 100 acres, and these areas are separated by a quarter-mile. These forest openings benefit deer, quail, and turkey. Hardwood strips along drainages are regularly reserved from harvesting to provide wildlife mast and cover. Distributing narrow open strips throughout the forest enhances the variety of food and cover. Periodic clear-cutting of small areas, regeneration with even-age stands, and subsequent periodic thinnings are thought to provide good habitat variety without reducing timber yields.

Pulpwood forestry, stressing maximum fiber production, has been a dominant influence in the South. Pulpwood harvesting trends toward more mechanization and shorter rotations increase the period of open canopies following harvest and regeneration. But a projected increased demand for southern pine lumber and plywood may shift the trend toward growing high quality sawtimber in the South. This will mean fewer

producing more forage in the lighter stocked stands.

Fertilization

In the southern pine region, fertilization can increase pine production by 5 to 10 percent if sites are judiciously selected. On some sites, tree volume gains of more than 40 percent have been recorded. Forest fertilization also increases some desirable deer browse species while apparently not affecting less desirable ones. In most instances, both forage and pine growth are increased with fertilization. However, it is questionable whether range fertilization is economical when applied only for improvement of livestock forage quality (nutritive value). Through multiple use, the increased forage production plus increased pine growth may make fertilization feasible, where increases in just one product would not justify expense.

Prescribed Burning

Prescribed burning is useful for management of timber, range, and wildlife. It reduces fire hazards, controls brown spot disease in longleaf pines, reduces plant competition, increases visibility for tree marking and logging, and reduces logging slash. Burning also topkills brush, reduces litter accumulations, provides early green forage in spring that is palatable and nutritious, and attracts grazing animals. Burning may reduce some browse species, although it generally enhances resprouting and seldom kills if burning is done when the plants are dormant. Burning in winter on a 3- to 4-year cycle generally meets cattle needs by stimulating new spring growth. Herbage yields are increased by removing litter accumulations. Spring burns stimulate longleaf pine height growth; however, summer burns are detrimental to pine survival and possibly quail nesting. Burns may enhance aesthetic values by maintaining open, park-like stands, emphasizing vegetation changes, and increasing flowering plant visibility. Direct effects of fire on wildlife vary widely. Although some evidence of mortality has been reported, it is commonly thought that few animals are directly killed in fires.

Range Livestock Management

Several opportunities for improvement of range livestock management generally exist across the South since range management is usually at a low level. Stock laws, in diminishing open-range grazing across the South, have helped develop the range resource because people have been forced to control their livestock. This is the first step toward good management. However, the law has also provided a means to reduce or eliminate livestock from many high-producing ranges where forage is ultimately wasted. Range improvement opportunities involve forage management, prescribed burning, supplemental feeding, livestock breeding, and grazing systems.

Virtually all native forages in the South are deficient in nutrients for livestock during fall and winter. To improve forage availability and to stimulate succulent new

prescribed burned on a 3- to 4-year rotation. Use is heaviest immediately after burning but decreases markedly thereafter. Without supplements, cow herds produce calf crops below 50 percent, with weaning weights less than 300 pounds, and high death losses.

Several supplementation systems from hand feeding of cottonseed cake to self feeding of liquid urea-molasses supplements have been used to successfully improve livestock production on the southern forest-range. Supplementing native range with improved pasture also boosts cattle production and provides food plots for wildlife. The use of crossbreeding, good bulls, and regulated breeding seasons for efficient marketing improve livestock production and economic returns.

Herd health precautions such as controls of external and internal parasites, vaccinations, and early castration of bull calves should be practiced. Grazing systems, such as rotational burning improve forage availability and give forage plants a chance to regain vigor.

Socioeconomics Considerations

Multiple-use management can provide an additional source of income to rural communities. Many marginal, low-income, livestock operations become economically feasible by using forest range to round out forage supplies or increase the number of livestock managed. Projected demands for red-meat supplies in this country also seem to dictate that southern range livestock opportunities must be further developed. Energy requirements and point-source pollution from feed-lots can be partially reduced with additional range grazing.

Many opportunities for rural community and regional development exist in the South through improved education, technical assistance, and cost sharing. A major impediment to development of forest-range use in the region is the educational system. For decades forest-land management has been geared to timber production and forestry students are ingrained with prejudices toward resources other than timber. Range science and range management curricula in many educational institutions are very inadequate, even though potentials for forage production and utilization in the South may exceed those of western ranges. Scientists, educators, and managers must develop a coordinated program for fully utilizing the multi-forest resources of the South.

In 1978 a southern Range Evaluation Project was approved by the Chief of the Forest Service to test and demonstrate practical range, timber, and wildlife management levels on an operational scale. Social, economic, and biological aspects are to be monitored where possible, prior to and after prescribed manage-

ment levels are installed. Field work has been initiated in Texas, Louisiana, Mississippi, and Florida. The results will provide practical guidelines for multiple-use management in a demonstrable manner and provide alternatives for meeting requirements under the National Forest Management Act, Resources Planning Act, Multiple-Use Sustained Yield Act and Resources Conservation Act.

Projected economics of incorporating livestock grazing into the southern forests show a possible 17 percent internal rate of return on investments. Generally, highest returns per cow are obtained from lightly grazed range; greatest returns per acre come from heavily grazed range. A moderately grazed range probably provides the greatest financial benefits with the least conflicts with other resource uses.

The high cost and shortage of energy contribute to changing the methods for red-meat production in the United States. With inexpensive grain unavailable and increased fertilizer and livestock production costs, low-cost range becomes increasingly important as the key resource for meeting red-meat demands of the future. Consumers indicate little difference in preference between grass-fed and grain-fed beef. The desire to produce leaner red meat for the market place also enhances the demand for grass-fed beef. Furthermore, ruminant animals provide the only efficient manner in which to harvest much of the range forage.

Conclusions

In summary, the opportunities for red-meat production on the southern forest range are unique. However, judicious multiple-use planning and coordination are necessary to fully realize these range potentials. Researchers, educators, land managers, and administrators must work diligently and cooperatively to meet local, national, and world demands for food and fiber while providing other amenities from our limited forest land base. The South's "many splendored" forests provide a prime opportunity to assure successful accomplishment of true multi-resource management both now and in the future. To realize our opportunities for improvement of range in the South, several important problems must be solved. These include more information on interactions among resources, better educational programs regarding the multiple uses, and expanded technology transfer systems to implement sound management. Potential success in solving these problems appears high because of our increased awareness, legislation supporting implementation of sound management, and demands for multiresource outputs.

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PANEL IV

Ramifications of Vegetative Manipulation: to other users, environmental and economic (public land policies, Federal policies relating to private lands, private considerations).

RAMIFICATIONS OF VEGETATIVE MANIPULATION ON RANGELANDS

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This paper is intended to set the stage for the panel and discussion. Its purpose is to identify objectives, issues, methods and implications of vegetative manipulation on rangeland. In the absence of manipulation by man, the presence of such manipulation, by weather, wildfire, plant succession, insects, and wildlife will change rangeland vegetation. The basic question always is: will man's deliberate, planned, manipulation-benefit or harm rangelands when compared to *laissez-faire*?

Objectives

Management of range vegetation is intended, on selected sites, (1) to increase and sustain yield of preferred forage species; (2) to reduce or eliminate plant species of low nutritive value, palatability or yield; (3) to control poisonous plants; (4) to control erosion; (5) to increase sustained yield of water of good quality; (6) to provide wildlife habitat; (7) to preserve and enhance natural beauty and open space; (8) to increase recreational opportunities; (9) to maintain genetic diversity in ecosystems.

No priority is intended in the order of listing of these objectives. Several objectives may be completely compatible or complementary on some sites. Economic benefit/cost may determine that particular objectives be given first priority on some sites. But we take it as given that multiple use must, by law and policy, be a primary consideration on all range landscapes. Whether or not multiple use should be applied to all rangeland sites is arguable. One view is that soundest land use programs are those that put the land to its best use first. Other uses are added only if the benefits derived from them offset the losses to the primary use, or if they do not interfere with the primary use.

Attitudes

Points of view as to the impact of vegetative manipulation vary widely. All of us may share the sentiment expressed by Walt Whitman in 1892:

"I believe a leaf of grass is no less than the journey work of the stars.
And a mouse is miracle enough to stagger sextillions of infidels."

Many people take the next step; they believe that any human intervention in natural ecosystems is harmful

to agree with the dictum of the satirist Jonathan Swift, who, in his "**Voyage to Brobdingnag**," wrote:

"And he gave it for his opinion that whoever could make two ears of corn, or two blades of grass grow where one grew before, would deserve better of mankind, and do more essential service to his country, than the whole race of politicians."

Man, his flocks and herds have been charged with defiling grazing lands since ancient times. Ezekiel lamented (34:18):

"Seemeth it a small thing unto you to have eaten up the good pasture, but ye must tread down with your feet the residue of your pastures? and to have drunk of the deep waters, but ye must foul the residue with your feet."

Backpackers leave body wastes and campfire ashes in the wilderness areas; ecologists pollute the biosphere and other areas they study; bird watchers disturb the habitat of the birds they watch; campers leave residues and trample vegetation, so do hunters and anglers; herds and flocks of livestock trample and defecate on grass and water just as they did in Biblical times. So, too, do all wild herbivores, and even fish must defecate.

There are two widely held assumptions relevant to consideration of vegetative management. Malin, in 1956, stated these succinctly:

"... one of these is the assumption, tacit or explicit, that, as differentiated from plants and other animals, man's relation with the earth and all its properties are always destructive. A second barrier, which is really a corollary of the first, is that the imperative responsibility of any student of these matters is to provide the bases for restoring what man, especially 'civilized' man, has supposedly destroyed."

Both assumptions are subject to challenge, and Malin challenged them. He cited an account of a dust storm in northcentral Kansas written on the spot by Isaac McCoy in 1830. It is a vivid description which would equally well fit the dust storms of the thirties. Malin explicitly challenged the notion that the dust storms of the thirties were *caused* by "the plow that broke the plains."

Issues

Issues to be discussed here include:

1. Extent and value of rangelands
2. Land use policy
3. Wildlife-livestock grazing
4. Desertification
5. Manipulation of rangeland vegetation—methods and the ramifications: interactions: impacts and

Between 1967 and 1975, area of non-Federal pasture and range increased from about 507 million acres to about 570 million acres. Federal lands grazed amounted to about 265 million acres. Beef cow numbers increased from 34.4 millions in 1967 to 43.7 on January 1, 1976, while stock sheep declined from 20.7 million to 11.5 million.

In the 11 contiguous Western States and the Great Plains, non-Federal pasture and rangeland increased from 171 million acres to 181 million acres, beef cows from 22.7 to 23.8 million, a 5-percent increase. This is compared to an increase of more than 70 percent in the 31 Eastern States, where the beef cows increased from 11.7 million to 19.9. Numbers of beef cows in the 17 Western States declined in 1977 by 1.5 million. There were fewer beef cows in those States on January 1, 1977, than in 1967. Since sheep numbers declined sharply, it is reasonable to infer that livestock grazing pressure on pasture and rangeland in these 17 States is lighter than it was 10 years ago.

During the past 50 years, yield per acre of forage grazed has apparently increased, due, in my opinion, to the conservation work of Federal and non-Federal agencies and cooperating land-holders.

The USDA interagency work group in 1974 estimated that 568 million acres of rangeland in the 11 contiguous Western States and in the six Great Plains States were grazed by livestock in 1970. Of this area, about 200 million acres were Federal lands. Federal rangelands provided about 25 million animal unit months (AUM's) of grazing, non-Federal rangelands about 124 million AUM's.

Each AUM is equivalent in feeding value to about eight bushels of corn, or about \$20 per AUM at current prices—\$10 per AUM at 1970 prices. Estimated cost was \$4/AUM; inflation would make 1979 cost more than \$5/AUM.

Forage grazed by livestock had a gross corn-equivalent feeding value of about \$1.5 billion in 1970 and about \$3 billion currently in the 17 contiguous Western States, or, deducting cost, a net value, marketed through cattle and sheep, of \$.9 billion in 1970 and \$2.25 billion currently. In these 17 States, value of production of cattle, calves, sheep and lambs was about \$5.0 billion in 1967 and \$8.4 billion in 1976.

An estimated 20 bushels of corn-equivalent feed units disappear for each 100 pounds liveweight of cattle and calves produced. At corn prices, feed cost of beef production in 1970 was about \$25/100 lbs. liveweight. Currently it is about \$45.

The USDA work group estimated that 200 million AUM's from rangeland and forest grazing could be added to the 213 million used in 1970 by the year 2000 at a cost of \$684 million a year, or \$3.42/AUM. These projections were predicated on efficient use of all range for grazing without diminishing wood growth, water yield or water quality. The work group noted that:

"Maximizing for livestock production in the absence of multiple use is not permitted on Federal lands or on non-Federal forested lands."

to Good." Wildlife values were found to be quite variable, generally "Fair." Maintenance or enhancement of wildlife and other environmental rangeland values concurrently with sustained or increased livestock grazing may depend on vegetative management.

Just what do we mean by range condition? Is it to be defined in terms of abundance or absence of preferred forage species in thrifty condition, or in terms of sustained production of beef, lamb, game, other wildlife, water, recreation, natural beauty and absence of erosion? To what extent are these measures compatible? There is continuing disagreement as to the plant successional stage which provides both ecosystem stability and optimal livestock production.

There is a generally held opinion that overgrazing by livestock is a major cause of range deterioration. Yet heavy stocking may produce more liveweight than light stocking, even after many years of such stocking. Vavra, Rice and Bement in 1973 compared productivity on Blue gamma range on the Pawnee National Grasslands in Colorado after 32 years of light or heavy stocking. The heavily grazed areas allowed 8-9 acres/head, and the lightly grazed areas allowed 21-27 acres/head. After this period, the heavily stocked area produced about 11 lbs. gain/acre with yearling heifers compared to about 5 lbs/acre for the lightly grazed area.

Historical accounts of range condition vary widely. Early tales of grass belly-deep to the horses were often reported. Millions of acres so described are now dominated by brush. Why? Has uncontrolled grazing reduced or eliminated preferred forage species?

Fire has been described as the first great force employed by man. Burning by primitive people may have been the determining factor in establishing and maintaining the grasslands of America. In the absence of fire, forests may invade and replace moist prairies; xeric brush invades and eventually dominates semiarid areas. It is arguable that all grassland ecosystems are disclimax systems, continuing to exist only as grazing pressure, fire and human activity prevent succession to brush or woodland.

Dideriksen has estimated that about 62 million acres of pasture and range have a high potential for conversion to cropland. About 32 million acres of these "cropland high potential" acres are in the 17 Western States, 16 million in the Southeast and 13 million in the 19 Northeastern States. Vegetative management on these lands to make their production of forage equal in economic value to cropland is essential. Major factors determining future use of such lands thus include not only applications of vegetative management technology, but also fertilizer prices, grain prices, beef prices and, in the semiarid areas, priorities for water use. Industrial, urban, and household use are likely to have higher priority of water use, at least of first use, than agriculture. Such priorities may on the one hand deter the use of irrigation for forage production, and on the other hand, insure continued use of prime range land without irrigation. A hundred cattle drink about an acre foot of water in a year.

The farm price of corn in 1967 averaged \$1.07; live cattle sold for about \$22.50, the cattle:corn ratio being about 20:1. In 1976 the cattle:corn ratio was about 15:1, and beef cow numbers decreased from 43.7 million on January 1, 1976, to 41.4 on January 1, 1977. On the Board of Trade, December 18, 1978, corn closed at \$2.20 a bushel, and the price of live cattle on the Mercantile Exchange was \$58.30. Will this 26:1 cattle:corn ratio last long enough to provide incentive for investment by cattle producers in vegetative management technology?

Policy

National policy "to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man" was included in the purposes of the National Environmental Policy Act of 1969. The Act also requires environmental impact statements to be prepared, including detailed statements of the environmental impact of proposed major Federal actions.

Environmental impact statements were designed to bring out all the facts. In absence of facts, expert opinions—and experts may be interested parties—fill the gaps.

Regulatory agencies hold hearings. Congressional Committees hold hearings. Regulatory actions and legislation sometimes follow. Reports are inevitable.

Courts provide the final forum when Federal agencies are challenged on lack or alleged inadequacy of their proposed actions.

Court actions have led to preparation of more and more detailed Environmental Impact Statements, delaying or averting some disputed proposals.

Multiple use of Federal rangelands is required by law and policy. The Soil Conservation Service (SCS) provides technical assistance to land owners and users of private lands. Such technical assistance includes projection of the potential of range sites for alternate patterns of use, from maximizing livestock produced to maximizing wildlife production. The user of private rangeland selects the alternate that is in keeping with his or her objectives and needs.

On October 30, 1978, Agricultural Secretary Bergland issued the Secretary's Memo No. 1827 Rev., "**Statement on Land Use Policy.**" That memo states, among other things, that the Department will continue to recognize and respect the rights and responsibilities of landholders in making private land use decisions.

The Department will advocate actions that reduce risk of flood and minimize flood damage; assist in reclaiming surface mined lands; protect threatened and endangered animal and plant species and their habitat; and conserve natural and man-made scenic resources. All these advocacies are relevant to vegetative management on rangelands.

Wildlife-Livestock Grazing

Game animals and birds compete with livestock, and with man, for feed and habitat. Deer are the most numerous of the game species in many areas. Deer are

provided by controlled burning with an area of dense brush. Summer deer population in the opened area was 131 per square mile during the second year after treatment, compared to 30 per square mile in the untreated area.

Deer population in the South increased tenfold from 1955 to 1970 while deer populations in other areas of the United States fluctuated or declined. This was a period of shift from cotton to cattle in the South, with increase in favored deer habitat, and control of the screw worm in Florida. Deer populations on the National Forests have continued to decline since 1970. The 1970 deer inventory of the National Forest System was 3,609,000. In 1976 it was 2,698,000. Hunter-harvested deer declined from 493,000 in 1970 to 312,000 in 1976—from about 13.7% of inventory to about 11.5%. One deer was killed for each 29 hunter-days in 1970, one for each 44 hunter-days in 1976. Competition with livestock is an unlikely cause of this decline in deer population. Cattle grazing on NFS lands changed little from 1970 to 1976, while sheep numbers grazed declined sharply. Hunter harassment, the many nonhunter visitors to the NFS, effective fire control, and predation by coyotes and other predators are possible factors contributing to deer population decline.

What can vegetative management contribute to increasing deer population? What will it cost? How much public funding is justified? Federal? State? There is a doctrine that non-migratory birds and animal wildlife are the responsibility of the States. Is a livestock producer responsible for spending his private funds to maintain wildlife habitat on private lands?

Game animals and birds provide about 2.5 pounds of meat per capita to the people of the U.S.—very unequally distributed. Trophy hunters, pot hunters—what is the public responsibility to, and for, them? Are we to have managed game and non-game populations, so managed as to provide sport or meat to those who hunt?

Our taste in game is limited. Jackrabbits are little prized; while horses and burros are not viewed as game animals. Yet people, many people throughout the world, eat this meat; dogs love it; minks thrive on it.

Jackrabbits are more numerous competitors with livestock and game animals for forage. As rabbit populations increase, so do the coyotes—more rabbits, more coyotes. Currie and Goodwin in 1966 found that 5.8 jackrabbits consume as much forage as one sheep. In 1960, 14,000 jackrabbits were killed on 5,000 acres in the Curlew Valley in Utah.

Many people prize wildlife and birds as components of the ecosystems in which they exist, contributing to the dynamic equilibrium of those systems. Others find all plants and creatures, large and small, as wonderful or curious. People take pleasure in bird watching, in tracking, in backpacking. Their objectives may or may not be compatible with those of the hunter.

Vegetative management to establish and maintain nature trails, habitat, plants, and animals which attract visitors and assist in minimizing their impact on the

sentiment determine the importance of wildlife, open space, and recreational values.

Wildlife as a Food Resource

Managing vegetation to provide food and habitat for bison, antelope, deer, quail, grouse, pheasants and other game birds and animals as food resources may compete biologically with cattle and sheep. Whether or not fawn meat would suit the taste of the many people who do not like lamb I know not. Game animal meat could be harvested and marketed by game farms and ranches. Should the hunter submit his venison to Federal-State meat inspection to make sure it is safe and wholesome? Meat quality and cookery for game differ for beef and venison, broilers and pheasants. Wayne Cook in 1977 estimated that cattle are 64 percent as efficient as sheep, and sheep are 47 percent as efficient as rabbits when compared under range conditions on a sustained yield basis.

Diversity

Vegetative manipulation, for example the reseeding of large range areas with a single species such as crested wheat grass, may reduce diversity. In the opinion of many ecologists diversity of vegetative species is essential in maintaining ecosystem stability.

R. M. May in 1973 concluded that empirical evidence is insufficient to permit a decisive answer as to whether or not complexity promotes population stability in the real world. His analyses of multispecies models, food webs and qualitative stability theory indicated that, as a mathematical generality, increased multitrophic complexity makes for lowered stability.

Biosphere reserves have been established to provide opportunity for observation of time trends in diversity in ecosystems with minimal impact of human activities. Such observations will provide baselines to measure the impact of human activities in comparable areas. Presently we have abundance of expert opinion.

Until we know objectively whether or not diversity of plant and animal associations is essential to optimal productivity of range ecosystems, should diversity be protected in a major portion of the range area?

A report prepared for the U.S. Department of the Interior by the Nature Conservancy is captioned "Natural Diversity, A National Imperative." The report attributed to Aldo Leopold the statement: "The first prerequisite of intelligent tinkering is to save all the pieces."

Desertification

There are two hypotheses with respect to desertification. First, desertification may be caused by changes in the patterns of global atmospheric circulation over "long" periods of time, and seasonally. Two examples given by Reid Bryson at the "Crop Productivity" Conference in Boyne, Michigan, in October 1975, illustrate this. Subtropical atmospheric systems move north and south with the seasons. When they fail to move as far north as usual, monsoon rains fail. Longer periods of climatic change are associated with arctic tempera-

The last glacial period ended about 11,000 years ago. During the ice age Rajasthan in northern India was a total desert. There was no monsoon. When the ice age ended, the monsoon rains came back. The area was farmed and people lived there for about 5000 years. Then about 1900 B.C. the rains failed again for 600 years. Again there were no people in the area until about 2000 years ago when people returned.

Bryson described a climatic shift in 1200 A.D. when arctic cooling caused prevailing westerly winds to shift south. They brought dry air to the Dakotas, Nebraska and Iowa causing a 200-year drought.

Winds in pre-Columbian times carried dust from the Southwest, dropping it in eastern Nebraska and Iowa, on Crowley's Ridge in Arkansas and across the Mississippi to form loessial soils in those areas. Winds blew and dust storms were catastrophic in the 30's and 50's of this century.

The second hypothesis holds that human activities may be a major factor in desertification. In semiarid areas, removal of vegetation by overgrazing and by fuel use of shrubs and trees leaves the soil exposed. Wind and water erosion follow, especially during 2-year drought periods, and revegetation fails.

Certainly bare soil is easier to move than vegetated soil. How much man contributes is arguable and argued.

Sauer in 1956 cited an 18th Century report by Father Escalante that there was excellent grass between the Hopi villages and the Colorado, an area of shifting sands in the present century. The history of the Navajo lands, from the time sheep and horses were introduced until recent years, is often cited as an example of severe soil degradation due to overgrazing. Ogden in 1978 published an historical account of Federal efforts to assist the Navajo people make their flocks more efficient, reduce stocking rates, and conserve the soil.

Finally, vegetative manipulation must take account of the immediate consequences of disturbing arid ecosystems in ways that may contribute to desertification.

Vegetative Manipulation Methods

Vegetative management involves tools—tools which, when effectively used, have short-term adverse impacts on the environment, though it is hoped they inflict no irretrievable damage. The National Environmental Policy Act (Public Law 91-190), declares as national policy:

"... to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man, . . ."

The tools include fertilizers, fire, mechanical devices, biological control agents, chemicals.

There are no innocuous, effective tools for vegetative management.

All plants require nitrogen, carbon dioxide, oxygen, a variety of minerals, water, and sunlight in an ambient temperature covering a very narrow range, usually from zero to 40°C. In excess, these essential environmental components become phytotoxic and may pollute soil.

Fire, wildfire, even controlled fire, inflicts damage on some organisms while benefiting others.

Mechanical destruction of brush or seed bed preparations for seeding may hasten soil erosion.

Vegetative manipulation includes control of weeds by herbicides. Herbicides are very useful tools in vegetative management. They may be aerially applied on terrain difficult to treat by alternate methods. They are more selective than burning. They may be used to control broadleaved plants without harm to grasses or conifers.

Application may be accompanied, however, by drift and damage to vegetation in non-target areas. Silvex and 2-4-5-T contain trace amounts of TCDD, a highly poisonous contaminant, present in commercial supplies in minute amounts. Opinions as to the potential hazard of these trace amounts of TCDD to man, animals, and the environment vary widely.

Pesticides have been used to control rodents and the plague-infested fleas they occasionally harbor; other vertebrate pests; insects, ticks and mites.

Insecticides have been used on millions of acres of rangeland to control range caterpillars and grasshoppers.

Range grasshoppers infest about 10 million acres of rangeland per year at or above the "economic threshold" of 8 per square yard. That is equal to almost 40,000 per acre. Each grasshopper eats about 1.1 grams of range forage dry matter during its lifetime. At that rate of infestation, uncontrolled range grasshoppers would consume the forage equivalent to that needed to supply more than a million AUM's. Grasshoppers overgraze, especially in dry years. They reduce forage availability for game animals as well as livestock. Grasshopper overgrazing can bake soil, making it more erodible.

Biological control of grasshoppers is not yet feasible. The economic benefit/cost ratio of chemical control of grasshoppers on rangelands has been estimated at 29:1. Chemical control with malathion may reduce populations of bees and some aquatic organisms in treated areas.

Bees are useful on rangeland as pollinators.

Success was achieved years ago in biological control of the Klamath weed on California ranges by a leaf-eating beetle introduced into Australia from France, then to California from Australia. Control of prickly pear has been discussed for years. Insect pests with specific weedhosts are sought. May we anticipate biological control of poisonous plants?

Reseeding

Reseeding favorable range sites may double forage production.

Wheat grasses, introduced in 1906 from Russian Turkestan, have been seeded on millions of acres in the Northern Plains, and intermountain ranges provide abundant spring grazing.

Legumes are receiving a great deal of attention as possible sources of nitrogen for grass in range ecosystems.

Mesquite is viewed more as a problem than a resource except during drought.

Palatable brush browse species may deserve increasing attention both for game and livestock forage.

Seasonality of Forage Production

Management of vegetation must be directed toward achieving forage availability during all seasons. In many areas, snow covers the range for months, preventing grazing. In other areas, some snow is essential as stock water to make livestock, especially sheep, grazing feasible. There are summer, spring-fall and winter ranges, and some all-year-long ranges. Vegetative management must fit each of these and in many areas must be integrated with harvested forage.

Rangeland grazing in the United States is predominantly by cow-calf and ewe-lamb enterprises. Seasonal forage abundance during the lactation period is essential to optimal productivity of such systems. Production of slaughter cattle on forage has been much explored during the past 5 years. Increased use of forage instead of feedlot grain would require more pasture and rangeland areas and more beef cows in order to sustain beef production at current levels.

Among the problems inhibiting increased vegetative management on rangelands is inflation. Not only are public funds increasingly difficult to obtain; vegetative management costs increase. Livestock producers are deterred by high interest costs, scarce credit, and unfavorable relation between costs of maintaining breeding herds and prices of cattle and sheep.

Aside from cost, vegetative management may require initial reduction in range use—lower stocking rates, or deferred grazing. Grass seeding on semiarid ranges may require 2 or more years for establishment.

Conclusion

Some of you may have heard Ian McHarg give his Morrison Lecture before the North American Wildlife and Natural Resources Conference in Portland, Oregon, in 1971. In it he said of man:

"He (sic) treats the world as a storehouse, existing for his delectation; he plunders, rapes, poisons, and kills this living system, the biosphere, in ignorance of its fundamental value."

This is a colorful, anthropocentric point of view. Toward the end of his lecture, McHarg quoted Darwin: "The surviving organism is fit for the environment." The surviving organism "man" will be predominantly urban and may anticipate 100 square feet of living space, if he is affluent, with TV bringing him views of wilderness and fantasies of space.

Vegetative manipulation, wisely accomplished, can be a major factor in keeping the rangelands beautiful for those who view them and productive for those who use them. Or, vegetative manipulation applied without regard to impact on the environment may hasten the

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WILDLIFE—DOMESTIC GRAZER ISSUE METHODS DESIGNED FOR BENEFIT TO WILDLIFE

By

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Many woody plants considered to be of low value for livestock production have increased on an estimated 82 percent of Texas grasslands. Consequently, numerous mechanical, chemical, biological, and natural techniques to reduce brush have been developed.

Some researchers suggest that management for livestock forage that includes brush control may conflict with wildlife production, while others report instances where brush control practices have been beneficial to wildlife.

Many of the target species of a brush control program provide food and cover for different wildlife species. The land manager should have basic knowledge of the requirements of wildlife that occur in his area, and if a brush control program is initiated, what impact this will have on all wildlife populations.

Habitat Requirements—Food and Cover

The basic requirements for most wildlife species are year-round supply of food and water plus a safe place to hide, rest, roost, nest, and raise young. Neither adequate cover nor adequate food alone provide all their needs. An exception to this may be the pronghorn antelope, as they do not require cover for survival. Pronghorns prefer wide open spaces where their remarkable eyesight and fleetness provide the needed escape from their enemies. In order to evaluate a brush manipulation program and its effect on wildlife, a review of the basic requirements of the major wildlife species is needed.

Food Habits

White-tailed deer are generally browse and forb eaters, consuming only small amounts of grass. Important browse species in the Rio Grande Plains of Texas include mesquite, granjeno, guayacan, catclaw acacia, como, huisache, blackbrush, guajillo, bluewood condalia, lotebush condalia, desert yaupon, and prickly pear (both fruit and pads).

Browse that is preferred by white-tailed deer in the Edwards Plateau Region of Texas includes Texas oak, shinners oak, live oak, woolly bucket bumelia, saw greenbrier, hackberry, wild plum, grape, redbud, and

In the rolling plains of Texas important white-tailed deer browse includes mistletoe, woolly bucket bumelia, polecat bush, mesquite, and prickly pear.

In addition to food, these plants offer escape cover for deer, and the eradication of a majority of these plants can lead to drastic white-tailed deer population reductions. Brush control, however, can be conducted in such a way that it can be beneficial to white-tailed deer.

Forbs or desirable broadleafed herbaceous plants are considered to be important in white-tailed deer diets. Some mechanical brush control methods (chaining and rootplowing) cause soil disturbance, and forb growth is enhanced by this initial disturbance. However, large chained or rootplowed areas can reduce deer populations. Darr and Klebenow have found that the larger the area chained, the lower the deer densities in these chained areas.

Like deer, pronghorn antelope prefer browse and forbs; however, cover is not a prerequisite for antelope range. Low brush or mesquite trees do not offer a serious handicap for the animals. However, brush is an important food source during critical food periods such as severe winter droughts. Die-offs of up to 60 percent of the antelope population have occurred on ranches where desirable browse was lacking. In the same area where desirable browse was present, antelope die-off was recorded as minimal.

Dense brush is important in bedding grounds for javelina. Species most utilized in South Texas include whitebrush, granjeno, guajillo, and blackbrush. Javelina rely primarily upon prickly pear, cactuses, and other forbs for the bulk of their diet.

Turkeys eat an extremely wide variety of foods. Their diets include a variety of grasses, grass seeds, browse and insects. Litton in 1977 found that 36 percent of their year-long diet was comprised of grasses, 19 percent browse, 15.6 percent forbs and 29.4 percent insects.

Woody plants or brush species are necessary to wild turkey populations not only as food-producing plants, but also as cover and roosting timber. If the welfare of existing turkey numbers is to be considered in brush control operations, adequate cover, roosting timber, and food-producing woody plants must be retained to

disturbed stands of woody cover in strategic locations, is generally beneficial to wild turkeys. However, extensive brush clearing has led to either reduction or elimination of wild turkey populations.

Competition with Livestock

In general, the major big game species in Texas prefer browse and forbs for the bulk of their diets. Results of a food habit study of cattle, sheep, and goats in the Edwards Plateau Region of Texas indicate the following:

Goats showed a preference for browse and mast during all seasons of the year when over 50 percent of their diet was comprised of these forage classes. Browse preferences of the goat and deer were similar, with acorns, shin oak, hackberry, green briar, woolly bucket bumelia, and live oak being relished. Utilization of forbs by the goat was appreciable only in summer when forbs averaged 38 percent of the goat's diet.

In this same study, sheep and deer were the heaviest users of forbs. Similarity in their diets was apparent in the spring and summer seasons. Forbs formed an average of 68 percent of the deer's diet and 65 percent of the sheep's diet during the summer. In a separate study in the rolling plains of Texas it was found that grazing by sheep in certain areas had a negative effect on deer densities indicating severe competition between the two species.

Cattle tend to exhibit the least competition for browse and forbs as cattle tend to prefer grass for the bulk of their diet. Cattle do, however, tend to utilize a high percentage of browse during winter months. It was concluded at the Sonora Experiment Station that grazing with cattle alone failed to reduce deer numbers, even at a heavy grazing rate.

Pronghorn antelope in West Texas were found to prefer forbs, with browse plants comprising the next highest percentage in their diet. Grasses comprised approximately only 4 percent of the year-long diet. Serious competition between sheep and antelope was indicated by the large number of antelope foods falling into the fair preference class for sheep. Also, there were indications that overgrazing was a serious problem on antelope ranges in West Texas.

Competition between javelina and cattle is minimal because of the cactus-related plant diet of the javelina. Competition does exist in rare instances where the supply of important food plants is low and javelina numbers are high.

In Texas competition between mule deer and domestic livestock is probably very similar to that of white-tailed deer and livestock. Keller in 1975 reported that grasses comprised only 5 percent of the mule deer's diet during the winter, with this being the peak for the year-long study. Browse made up 56.1 percent and 56.8 percent during the spring and summer, while forbs comprised 35.5 percent and 28.5 percent for this same period. During fall and winter months, forb usage increased to 52.7 percent and 51.3 percent respectively.

Overgrazing Problem

On well-managed rangelands which support a wide variety of forage plants, competition exists between wildlife and domestic livestock for certain kinds of choice plants. As the numbers of animals increase, competition becomes more severe for choice forage plants, and animals are forced to consume plants that are less desirable.

Although deer utilize a large number of browse and forb species, relatively few species of grass are preferred by deer. If key deer foods are destroyed or reduced, deer will not thrive even though other plants (grasses primarily) may still be available and the range appears in good condition. Domestic livestock, particularly sheep and goats, can exist on a grass diet even though they may prefer forbs and browse in addition to grass. Deer cannot exist on a grass diet on most Texas ranges.

Livestock overgrazing has been the major cause of the invasion of a majority of the brush species, and that overgrazing practice is still in effect today. Some landowners are starting to realize this problem and are correcting it with proper grazing techniques.

These techniques include primarily a reduction of total animal numbers on the range (both domestic and wildlife) and deferred grazing rotation systems.

Rangelands managed under deferred rotational grazing systems and reduced animal numbers have resulted in better quality livestock and wildlife as well as an improvement to the range.

Habitat Manipulation

The aspects of brush clearing have been in some cases detrimental to wildlife and in other cases helpful. Anytime a brush clearing operation is considered by the land manager, he should be aware of how it will affect his entire wildlife ecology. This includes big and small game, game birds, songbirds, predators, rodents, or whatever wildlife exists on the affected area.

In general deer and other game animals are creatures of "edge." If brush is to be cleared to increase grass production, it should be controlled in strips or blocks alternating with untreated areas. Clearing should not be done on steep slopes subject to erosion, roosting places and other areas most attractive to wildlife.

Thorough evaluation of a target brush species should be studied. For an example, ashe juniper was the dominant woody vegetation on the Kerr Wildlife Management Area located in the Edwards Plateau of Texas when the area was purchased in 1950. This dominant species was a result of the absence of fire and man's overgrazing practices with domestic livestock.

Studies showed that deer-carrying capacity in solid stands of ashe juniper was low (1 deer per 30 acres) as compared to areas where more desirable browse was the dominant overstory (1 deer per 12 acres). This same study also showed that livestock-carrying capacity to be approximately one animal unit to 50 acres in ashe juniper habitat.

Ashe juniper, however, is beneficial for cover for white-tailed deer. It is also important to other forms of wildlife. The golden-cheeked warbler, a bird listed by the U.S. Fish and Wildlife Service as rare and endangered, requires bark of mature ashe juniper trees for its nests. Thus if all ashe juniper were eliminated through brush clearing, the nesting habitat of a rare and endangered species would be eliminated.

As a result of extensive research, ashe juniper has been left in strategic areas for cover for wildlife on the Kerr Wildlife Management Area while approximately 66 percent of the area has been cleared of mature ashe juniper. Native desirable forage species have increased since this brush clearing, and carrying capacity for white-tailed deer and domestic livestock has approximately doubled. This clearing has not affected the golden-cheeked warbler, as it is a common summer resident of the Area.

Before planning a brush control program, all wildlife requirements in an area should be evaluated. Key food and cover plants should be identified and taken into consideration in a brush-clearing program. Soil type is also an important factor as some key wildlife plants are only found on certain soil types.

The proper width of strips or blocks varies with topography, soil type, brush density, and needs.

The successful integration of wildlife and domestic livestock use of our rangelands requires careful and competent planning. As the demands for wildlife recreation and greater domestic animal and fiber protein production increase, multiple use of these resources will become more complicated. Only through understanding the entire ecological concept of the rangeland will the proper decisions be made and desirable goals be achieved.

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RAMIFICATIONS OF VEGETATIVE MANIPULATION — ENVIRONMENTAL CONSIDERATIONS

By

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Intensive overgrazing has resulted in the removal of desirable and native species of plants (grasses) from our rangelands, and subsequent invasion by shrubs, such as sagebrush and pinyon-juniper, and exotic species such as Macartney rose. Since extensive vegetative manipulation may be undertaken to restore rangeland to forageable condition, I was asked to comment on environmental considerations of the several methods available for control of such vegetation.

Assistant Secretary of Agriculture Rupert Cutler told this Symposium on January 29, 1979, that the demand for range grazing is twice the supply. Pressure to bring more rangeland back into good and usable condition increases as the demand for more food supplies also rises. An unreleased 1974 USDA report supported the conclusion that there was "no alternative for contributing to food for man other than by way of grazing animals." Range scientists are committed to the goal described in the following statement made by Drs. Scifres and Merkle of Texas A&M:

Almost half of U.S. land area is used for grazing, and most of this rangeland. Thus meeting the growing demand for grass fattened beef calls for increasing productivity of rangeland pastures.

Since 1955, a standard textbook on range management has been telling generations of students that range management is "the science and art of obtaining maximum livestock production from rangeland consistent with conservation of the land resources." This goal of maximum production has been pursued intensively since that time. It has resulted in some improvements in recent years, but the overall condition of our 1.56 billion acres of forest-range has continued to deteriorate. At present 54 percent of this acreage is in poor or very poor condition.

To increase rangeland productivity, one must manipulate vegetation, often through herbicide spray programs. It is the geographical scope of such spraying¹ together with the increasing quantity of herbicides used²

on these vast lands that concerns environmental scientists. Aerial application of herbicides affords the possibility of chemically treating half of the United States acreage at one time or another. Although there are a variety of methods available for vegetative manipulation—fire, mechanical and chemical—it is the use of aerially applied chemicals that concerns us most.

In support of the use of these chemicals for vegetative manipulation, users, both private and public, point to successful use history since the 1950's, low mammalian toxicity, and last but not least, the official registration by the Environmental Protection Agency (EPA). Environmental impact statements (EIS's) have in fact defended use as follows:

All herbicides proposed for use have been registered with the U.S. Environmental Protection Agency after having been found to perform their intended function without unreasonable adverse effects on the environment, human beings, livestock or wildlife when used in accordance with widespread and commonly recognized practices.

It was the expansive character of DDT that led to its ubiquitous use in the South and elsewhere against a spectrum of insects. The sanguine faith placed in the chlorinated hydrocarbons in the early 1950's has now been transferred to the phenoxy herbicides, of which 2,4,5-T is the most well known. In the 1970's, the dramatic rise in pesticide use is primarily due to increased herbicide use.

Yet pointing to EPA registration as an indication of safety has critical drawbacks. It is important to remember that nearly all the currently registered pesticides (some 50,000 registrations) were registered prior to the 1972 Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), which imposed new requirements for extensive tests before pesticides could be registered or reregistered. The studies that need to be completed before these pesticides can be reregistered may take 20 years or longer. Many studies have not even been started. Others need to be evaluated, redone, or completed.

Although most herbicides have not been as well researched as have many insecticides, a considerable body of knowledge on 2,4,5-T and its contaminant,

¹1.56 billion acres of forest range in grasslands, as well as forest that can produce vegetation grazable by livestock (31 percent Federal, 69

concerns regarding 2,4,5-T and dioxin are contained in EDF's legal briefs filed in 1974 and in our comments and letters to EPA in regard to the Agency's rebuttable presumption against registration (RPAR) on 2,4,5-T, published in April 1978.

The environmental community's concern about 2,4,5-T's potent health effects is reflected in two legal suits brought in the early 1970's. Represented by the Natural Resources Defense Council (NRDC), environmentalists successfully challenged BLM's proposed 2,4,5-T spray program to eradicate mesquite in southeast New Mexico in 1973. EDF took over an April 1970, petition asking EPA to ban and suspend 2,4,5-T registrations, originally initiated by Harrison Wellford and the Consumers' Union. In November 1971, EPA ordered a hearing on the cancellation issue, but Dow Chemical Company, manufacturer of 2,4,5-T, succeeded in winning an injunction against holding the hearings.

EPA appealed to the U.S. Court of Appeals for the Eighth Circuit, and EDF filed an *amicus curiae* brief supporting EPA. In 1973, EPA again announced that it would conduct hearings concerning the cancellation of 2,4,5-T. The hearings were scheduled to begin in August, but were called off by EPA on June 24, 1974. In the intervening 5 years we have been parties in EPA's Dioxin Implementation Program, established to determine if dioxin bioaccumulates in the environment.

Of particular interest to those of you at this symposium are findings of TCDD in cattle grazing on rangeland treated with 2,4,5-T. In one recent study, Dow Chemical Company found and verified TCDD at 3-4 ppt in three of eight samples of beef fat from a ranch in Iron County, Texas, which was sprayed with 1/2 pound of 2,4,5-T per acre in 1974. Angus cattle were put on pasture 10 days after treatment, removed 30 days later and held on untreated areas for 2 weeks before slaughter (according to label use directions for meat animals). The farm was a 1,300-acre fenced lot. The animals were only grazing on the treated pasture for 30 days.

Further indication that dioxin bioaccumulates was found by several laboratories analyzing fat from cattle grazed on 2,4,5-T-treated rangeland in Kansas, Missouri, Oklahoma and Texas, as part of EPA's phase 1 of the Dioxin Implementation Monitoring Program. Of the 68 samples from treated rangeland, as many as 15 of the samples may have had detectable TCDD residues. Dow Chemical Company's summary of these results is as follows: (Data provided at the April 9, 1978, Dioxin Program meeting in Washington, D.C.)

Controls		Not Samples detected	Uncer- tain	Possible ppt 5-10	10	20	Probable 20 ppt	Positive 70 ppt
11	KS	15	11	4				
0	MO	14	7	2	1		2	1
5	OK	19	14	2	1	2		
5	TX	20	20					
21		68	52	6	2	2	2	1

The only negatives were from controls, or from the lowest sprayed state, Texas, where 1/2 pound per acre has been the rule because it gives more consistent results

objectives of the Dioxin Program was to determine whether or not TCDD accumulated in food destined for human consumption. Not only do these findings answer that question affirmatively, but the residues were detected in direct proportion to the rate of application.

The stability of TCDD in the environment and in biological tissue is evidenced by two instances in which TCDD was recovered in fish from areas distant from the source and after a period of as long as 2 years. In a recent series of studies, Dow found highest concentrations in catfish (230 ppt at Smiths Crossing) below the Midland, Michigan plant, lesser concentrations downstream (70 ppt at Freeland), and lowest concentrations (24 ppt at Saginaw Bay) near the bay many miles away. Samples from above the plant contained no TCDD.

Samples taken in 1978 from the same waters and analyzed by EPA's Research Triangle Park laboratory confirm the TCDD residue levels of fish analyzed by Dow in 1976. Similarly, nearly a decade ago, in 1970, TCDD was found in fish taken from Vietnamese rivers all outside of, but downstream from, areas which had been heavily treated with 2,4,5-T. Concentrations ranging from 18 to 810 ppt were found. TCDD levels tended to be higher in fish from interior rivers than in those from seacoast locations.

Adverse effects of 2,4,5-T and TCDD on animal reproduction (e.g., stillbirths, fetal death, and embryotoxicity) have been routinely observed experimentally. Recent reports state that 2,4,5-T readily crosses the placenta in the mouse on gestational day 13. Concentrations of 2,4,5-T in maternal and fetal tissues were detectable at 30 minutes, highest at 8 hours, and were eliminated by 48 hours.

These experimental observations have their environmental counterparts in effects of spraying on domestic livestock. In May 1977, a hillside pasture in the Pacific Northwest was sprayed with Weedone, a 2,4,5-T product made by American Chemical. The following January, 17 ewes held on this separate hillside pasture gave birth to 11 dead or deformed lambs.

Use of other herbicides has also been known to cause problems on rangeland. In one such case, simazine and aminotrizole were sprayed on a pasture. The following morning 4 of the 30 ewes grazing on the weeds were staggering. Two died by evening, and an additional 8 were staggering. All became ill, and all died within 3 to 7 days of the first clinical signs of poisoning. Pathological examination of the sheep revealed congestion of the liver and mild pulmonary edema. Simazine was detected in the rumen contents and livers of the sheep.

When such incidents follow use of a registered pesticide, applied according to label directions, there may be a question regarding how much adverse effect is "unreasonable." In some cases there are explanations for such incidents, such as contaminated batch, etc., but when such incidents occur, users should know of potential adverse effects in order to avoid problems or to consider alternatives.

In addition to livestock, food plant materials have also shown herbicide residues. Recent reports on persistence of 2,4,5-T have documented high residues after

Residues of 2,4-D and 2,4,5-T of 30 to 60 ppm were found in leaf vegetation sprayed in Lapland, Sweden in 1974. These residues persisted for up to 2 years in leaves under certain circumstances. In Finland, as a result of a spray program from 1974-1976, residues of as much as 7 ppm of 2,4-D and 15 ppm of 2,4,5-T were found on lingonberries. In wild mushrooms as much as 1.2 ppm and 1.8 ppm, respectively, were found. In foliage, as much as 31 ppm of 2,4-D and 30 ppm of 2,4,5-T were found, 13 to 43 weeks after spraying. The berries and mushrooms harboring residues were collected 2 to 13 weeks after spraying.

Spray operations also affect water supplies. Between 1965 and 1968, 2,4,5-T was detected in U.S. surface water at concentrations of 0.01 to 0.07 ppb. During that same period, 2,4,5-TP (Silvex) residues in surface waters from 15 Western States ranged between 0.01 and 0.21 ppb.

The interrelationships and multidisciplinary problems may seem difficult enough without asking range managers to consider such intangible pieces of data as "potential adverse effects" of chemicals on livestock or man. We maintain that they cannot afford to ignore such information after it has come to light.

Decisions in herbicide chemical use currently rest on the interplay of many environmental and plant growth factors. These include effective rate of application, necessity for retreatment, proximity to nontarget crops susceptible to growth regulator herbicides, the stage of growth at which the target plant is susceptible to sprays, the variation in herbicide effectiveness due to soils and growth form, and weather patterns such as drought which severely reduce effectiveness of sprays. Such complicated factors make it clear that decisions as to when and how to use chemicals must be made very carefully, and only when necessary.

If a manager's decision is to take into account all the implications of his action with a long-range view of overall land resource management, brush control opera-

tions should be regarded as one part of an improved grazing management program. Brush control operations should in fact be planned 5 to 15 years ahead to assure maximum benefits in the overall range management program.

An integrated or systems brush management as a component of overall range improvement programs may include basal treatment with herbicides, ground or aerial application with herbicides, oiling or grubbing, prescribed burning, bulldozing, rootplowing, chaining, and cabling. It may also mean a desired shrubland composed of wanted shrubs, forbs, and grass.

Improvement of deteriorated rangelands is extremely slow, and some grazing rotation schemes can even hinder or prevent range improvement. Removal of all livestock from a given area for a specified time encourages most desirable forage species to produce seed before grazing is resumed. The length of this period is determined by the response of the desired vegetation in order to ensure sustained levels of vegetative production. The success or failure of the program rests on the observation and good judgment of the rancher.

No single method will give effective economical control under all conditions. Factors involved include growth forms, density of infestations, associated brush species, rainfall, soil composition, topography, condition of vegetative cover, potential productivity of the rangeland, capital outlay required, initial and continuing control efficiencies, and last but not least, environmental and human health impacts including effects on wildlife.

These are some of our concerns regarding vegetation manipulation. It is hoped that environmental concerns will be taken into account in developing grazing policies on rangeland. There is a vital long-term interrelationship between grazing management and brush control. With appropriate planning, sustained levels of vegetative production can replace the attempt to achieve maximum rangeland productivity.

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RANGELAND POLICIES FOR THE FUTURE

By

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It is certainly my pleasure to be here as a participant at this Symposium and I congratulate those who put this program together. It especially pleases me that an effort has been made to include representatives of the private sector such as environmental groups and the organization I represent, the National Association of Conservation Districts, or NACD. Although I am representing NACD today, I will be making my remarks from my experiences as a farmer-rancher and Conservation District Supervisor in New Mexico.

I have been asked to discuss with you some general concepts from our viewpoint concerning vegetative manipulation.

Before I begin my presentation on this subject, I should like to tell you some things about conservation districts. In New Mexico, they are known as Soil and Water Conservation Districts. Each District is governed by a Board of Supervisors representing the landowners within the District. It is the responsibility of the Board to develop a comprehensive soil and water conservation program by an assessment of the problems and determination of needs and priorities to solve the identified problems.

Although the problems may vary from one place or District to another, we all share a concern for the wise use of our soil and water and other natural resources. I am sure this is a similar situation among the districts throughout the country.

In fact, both at the District and the National level, our objectives are based on the single premise that effective work for the conservation and development of natural resources and for the improvement of the environment can best be done by those who live on the land and use it.

This basic premise is easily understood by nearly every responsible organization or agency or anyone else interested in the wise use of resources and a quality environment. However, many people have different ideas about the methods perhaps in utilizing natural resources on public lands, in particular public rangelands. Let me outline some of our organization's objectives regarding all lands, including the public rangelands.

We believe the needs for conservation and improvement of the environment extend throughout the land. To find solutions to resource and environmental prob-

cooperation of many organizations, public and private. We encourage the adoption of cooperative working agreements between Conservation Districts and all public agencies that can help in carrying out District Programs.

We believe that the comprehensive conservation program developed by the District—a program encompassing all problems on all the lands within the District—to be the most effective mechanism for resolving those problems.

As you know, Soil Conservation Districts were born due to the wholesale neglect of our soil resulting from generations of misuse. Every school child has studied the history of the Dust Bowl of the thirties and the depletion of valuable topsoil and gully erosion in the East and Southeast United States. More recently, the Nation and environmental groups, as well as livestock grazers, have been concerned about the deterioration of our rangelands in the West.

In all of these situations, one characteristic is common. When the natural vegetation is removed and no compensating management or treatment is practiced, accelerated erosion is the result. In addition to depleting the land resource, this accelerated erosion pollutes our waterways and has a negative effect on the environment.

The control of soil erosion is the primary function of Conservation Districts. Unfortunately, our forefathers lacked the foresight, or perhaps the initiative to recognize that the continued heavy stocking would deplete the natural vegetation. In many parts of New Mexico this is evidenced by the encroachment of undesirable vegetation.

My native State, New Mexico, is a land of diversity. Its climate, soils, topography, minerals, its people and its cultures represent a diversity shared by few States. We also have a dubious distinction as well regarding the number of species of undesirable vegetation.

Let me list some of them:

1. Pinyon and juniper
2. Creosote bush
3. Mesquite
4. Cholla (pronounced CHOY-YA)
5. Oak shinnery
6. Sagebrush

In much of the State, as a result of our arid climate and other factors, undesirable vegetation is a serious problem. It is our policy that these lands be treated and managed in such a way as to restore native grass for forage for livestock and wildlife and to control soil erosion.

In fact, our family operations are dependent on forage production for livestock grazing on both private land and public lands, and we have seen the need for vegetative manipulation to accomplish this. My dad and uncles can show numerous examples where pinon-juniper and other brush control, reseeding grass, and good range management have resulted in more forage, reduced soil erosion and an increase in wildlife populations.

(I should mention that the King family of which I'm a member is not related to the King family of XIT fame.)

It is sometimes difficult for ranchers to understand why there is a controversy surrounding the need for control of undesirable plant species. Pinon and juniper, for example, will take over in an area and prevent the establishment of a good grass cover. This, of course, results in a loss of forage and an increase in soil erosion. Even reduced stocking or the complete removal of livestock will not help the situation.

Creosote bush is one of the worst. This plant will out compete all other plants for the needed moisture to become established.

I could go on and on but I will make this point: something needs to be done about outdone but desirable vegetation. Whatever tools are available that are economically feasible and practical, and that have no environmental side effects, are needed. In the old days, a lot of the tools were mechanical. Such operations as grubbing, chaining and so forth were expensive enough in terms of labor and fuel, but now are almost out of reach as far as cost is concerned.

We see the need for research into alternative methods for vegetative manipulation. Since all of us were warned

by Fred Tschirley to avoid polemics on 2,4,5-T we feel that much of the controversy surrounding some of the tools is unfortunate, and in some instances, misguided.

Cost effectiveness matters are increasingly placing limitations on the tools available.

Once all the ramifications of vegetative manipulation are considered, such as the positive aspects of land improvement, increased forage production for livestock and wildlife, reduction of nonpoint pollution from soil erosion, and the increased environmental and aesthetic values, we think everyone would agree on the necessity for such tools.

Again, it is our belief that Conservation Districts are comprised of individuals who desire to see the land improved through the application of treatment and management. We desire to use the land wisely, make a living off it, and leave it in better shape for the next generation. This can be done through the cooperation of all of us, including public agencies, Districts, and private citizens.

No single one of us, nor one single agency, can do it. It takes all of us. But before we can begin, we have to agree on the need.

Perhaps in the future, some controversies can be avoided so that a livestock operator on public lands can install the improvements that are needed to allow him to practice good range management. Not only will he be a beneficiary, but all of us desiring a quality environment will benefit as well. Districts throughout the country offer their assistance and cooperation in assisting all organizations to continue the practice of multiple use, conservation and range management, and coordinated planning.

Thank you for this opportunity. Should you visit New Mexico, I'm sure you will be made to feel welcome.

(Due to the illness of Mr. King, his speech was presented by Audi Miranda, Executive Secretary of the New Mexico State Soil Conservation Commission.)

INTEGRATION OF AGRICULTURAL HERBICIDE METHODS FOR VEGETATION MANAGEMENT OF RANGELANDS

By

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Almost half the land in the United States is classified for grazing purposes. Today's 890 million acres includes a decline since 1950 of 130 million acres of the forested grazing area. However the remaining grazing land has been significantly upgraded by gradual substitution of forage area due to clearing of brush, fertilization, seeding, and improved management practices.

While there are obvious economic and societal importances of rangeland, there are also considerable portions of grazing lands with weed and brush species offering little or no forage value. These vegetation communities are changed or influenced by grazing practices, cultural manipulations, plant introductions, diseases, insects, and many environmental factors.

Due to undesirable vegetation, attendant declines in economic and other resource values are substantial. These include low yields of forage and domestic animal units per unit area, livestock poisoning, reduced habitat value for many wildlife species, reduced ground water levels and increased costs for managing and producing livestock.

While herbaceous weeds are found on virtually all grazing lands in the United States, brush actually plays a more significant role when it comes to management considerations. There are 70 million acres of mesquite, 76 million acres of juniper, 96 million acres in sagebrush, over 40 million acres in scrub oaks and 78 million acres of cacti which are significant contributors to unproductive rangeland. When density of these species becomes so great that even wildlife populations are adversely affected, it is obvious that some type of vegetation management is necessary.

Methods and Integration

Vegetation manipulation can range from the extreme of doing nothing to a maximum investment or over-management position for purposes of high density nutritive forage production solely as a livestock feed.

Obviously, some path in between is optimum for balance of livestock, wildlife, vegetation and man.

Achieving that optimization involves the utilization of various vegetation management practices to prevent the encroachment of undesirable and/or poisonous

One of these management methods is through the safe and proper use of agricultural chemicals, but agricultural herbicides are by no means the sole solution to weed and brush problems. Other vegetation management tools include:

1. Mechanical means
2. Seeding
3. Fertilization
4. Grazing practices
5. Prescribed burning
6. Biological measures

Mechanical control for selective openings can be accomplished by chaining, shredding, roller chopping, dozing, power grubbing, root plowing and hand labor. These practices because of their costs are often done in strips or small blocks of land. Herbicides may be used as a follow-up practice for resprouts or where equipment accessibility is prohibitive.

Seeding, fertilization, and grazing practices more often serve to complement either chemical or mechanical practices rather than be a solution in themselves.

Prescribed burning is an alternative if there is enough understory vegetation to support a fire. Usually, prescribed burning serves as a maintenance practice for controlling brush regrowth subsequent to chemical and/or mechanical treatment.

Biological measures can play a role in vegetation manipulation if they prove efficacious, manageable in terms of being species specific, and controllable in area of use. To date goats are still the major biological control measure but their lack of selectivity in species control is a disadvantage.

It should be noted that agricultural chemicals can be integrated with all of the aforementioned practices. In fact, use of only agricultural herbicides with failure to integrate one or more of these practices, particularly deferred grazing, would likely be a useless expenditure of money for these products. Habitat or livestock openings are of little value unless grass and forbs are given the opportunity to become established.

Many groups, like the Texas Range and Brush Control Improvement Association, already practice integrated brush management systems either informally or

Types of Agricultural Chemicals and Use

In discussing agricultural herbicides for rangeland it should first be noted that rangeland is not a prime target market for chemicals. Today a herbicide is developed first for a major food crop or noncropland (industrial) use, and secondarily, if it fits, for rangeland. Therefore, most of the agricultural products for rangeland are the older, more established herbicides. Out of approximately 410 herbicides federally registered by EPA, only about 8 are cleared for rangeland use.

Major rangeland products and their uses include:

2,4-D	— Sagebrush and annual broadleaf weeds
2,4,5-T	— Mesquite, oaks, some cacti and some annual broadleaf weeds
Silvex	— Oaks, some cacti and some annual broadleaf weeds
Picloram (TORDON®)	— Mesquite ¹ , juniper, perennial/annual broadleaf weeds and other brush species
Dicamba (BANVEL®)	— Mesquite ¹ , perennial/annual broadleaf weeds
Atrazine	— Annual broadleaf weeds and some grasses
Dalapon (DOWPON®)	— Some grasses
Tebuthiuron ² (Spike)	— Nonselective
Glyphosate ² (Roundup)	— Nonselective

¹Requires 2,4,5-T in mixture

²Still under experimental investigation

The use of 2,4-D and 2,4,5-T accounts for better than 85 percent of the acreage presently treated. Interestingly enough use of these products has not grown appreciably since the mid-1960's and ranges from approximately 16 to 22 million acres in any given year. In fact, it is probably safe to say that brush (re)invasion has more than kept up with brush control, regardless of method of control, be it chemical or mechanical.

Application Practices and Improvements

Herbicide usage varies in terms of application practice, both aerial and ground, comprising large blocks of acreage, strip spraying, selective species or individual plant applications.

The majority of rangeland herbicide use, in terms of acreage sprayed, has been by air. Over the years, modernization and modifications of aircraft and application equipment have done much to provide for more effective, easier to apply, and safer herbicide treatments than in the past. Some examples include:

1. Shorter spray booms (maximum 3/4 of wing span)
2. Nozzles—to give more uniform droplet size (Rain-drop® and straight stream)
3. Positive shut-off nozzles and proper orientation
4. Lower spray volumes and lower spray pressures

Concerns related to spray drift and non-target effects are still very real. The lower spray volumes being used today must be applied only under low wind conditions and with application equipment that assures a minimum of drift.

Temperature inversions formed when winds are less than 2 miles per hour can be as detrimental at wind

also added by mandating that nozzle orientation be to the rear and 45 degrees downward coupled with spray pressures below 10 pounds per square inch. A very important factor in reducing off-target drift incidences has been applicator training.

Improvement in application equipment and practices is a continuing dynamic project.

Risk/Benefit

Herbicides themselves have changed. In the past, high rates of treatment were required to provide effective, and often times not selective, control. Today, many products work at one-half (0.5) pound per acre or less. Coupled with advances made in organic chemistry technology is the concern for impact of these products on the environment and toxicological significance especially to man.

Certain segments of society believe it is preferable to use highly toxic compounds which may have immediate lethal effects but have no chance for development of insidious side effects. However, most believe that less toxic active ingredients are preferable. Unfortunately, experimental animals can tolerate extremely high doses of these products. A potential problem is that these maximum tolerated doses may cause insidious toxic side effects, due either to the parent compound, its metabolites or even trace impurities.

One compound under such investigation is a major rangeland product, 2,4,5-T. While EPA is currently reviewing its benefit/risk equation under the Rebuttable Presumption Against Registration or RPAR process, the chief concern is about a toxic impurity in a relatively safe active ingredient.

The risk to man from the use of herbicides is mainly to the applicator. In the case of 2,4,5-T, actual measurements of exposure under field conditions have shown that applicators receive a dose of no more than 0.1 milligrams per kilogram of body weight when applying the product with a backpack sprayer. The annual risk of developing a tumor is a maximum of 0.4 per million for a backpack applicator applying the product each day, 5 days per week, 4 months per year for 30 years. Exposure hazard from other application practices is even less.

This low risk is even more obvious when one looks at the potential death rate from cancer due to exposure to other causative factors. Based on data presented by Dr. Richard Wilson of Harvard during the 1978 OSHA carcinogen hearings, the annual risk of death from cancer per million people is:

Eating and Drinking

Steak, 1/2 lb per week (charcoal broiled)	0.4
Drinking water in Miami or New Orleans	1.2
Diet soda, 1 per day (saccharin)	10

Tobacco

Smoker	1200
Being in a room with a smoker	10

Cosmic Rays

One transcontinental flight per year	0.5
Frequent airline passenger	15

The benefits of herbicides are virtually self-regulating. No one will buy something which does not provide either an aesthetic or economic benefit. Universities, government and industry, on both an individual and collective basis, conduct numerous studies to evaluate herbicides, their efficacy and benefits from use in integrated management practices. Product recommendations are based on facts, not supposition, and the consumer is our most critical reviewer.

Our ecosystem is under dynamic change, whether managed by man or nature. It is important that we

Summary

In summary, there is risk involved in vegetation management. The name itself implies risk. The integration of vegetation management practices, be they chemical, biological, fire, or manual, will have an inherent risk factor. Integration of these factors can minimize or increase that risk. But the biggest risk of all is doing nothing, and our future generations would suffer greatest from that practice.

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RAMIFICATIONS OF VEGETATIVE MANIPULATION, POSITIVE AND NEGATIVE ASPECTS

By

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The interest and participation of this large audience is an expression of concern for future management of rangelands, a concern which, for the most part, is associated with a product or products from these rangelands. Since there is a unique mix of products for each condition class for each range site and product, availability is changed by manipulating range condition. Positive or negative viewpoints arise, depending on whether this vegetative manipulation makes changes favorable to or contrary to our interests.

Management Goals Are Needed

Panel members yesterday discussed range condition, and in general, left the impression that management of rangelands is improving, as a higher proportion of these rangelands is now in higher ecological condition than in the early 1900's. Although I concur that a desirable mix of product returns along with range site stability often may be reached in the high condition classes, we should not assume that climax vegetation or excellent range condition is automatically the management goal.

Positive or negative viewpoints relative to vegetative manipulation are expressed in terms of products produced rather than ecological condition. An ecological range condition rating could be expressed on a rating of high to low to avoid the value judgment attributed by condition terms currently used to describe ecological range condition (excellent, good, fair, poor, and very poor). There is no basis for establishing excellent condition range as the management goal unless this condition class for a specific range site does, in fact, provide the mix of products yielded and land stability acceptable or desired from the site by interested parties.

Vegetation in high ecological condition for a desert grassland site may provide excellent livestock grazing and good habitat for antelope, scaled quail, and ground nesting song birds, but this same site in a low ecological condition might be better habitat for desert mule deer, javalina, Gambel's quail, and shrub nesting birds.

Rangelands should be managed so that productivity of the site is maintained, but a philosophy that rangelands are natural lands and only natural processes leading to climax vegetation should prevail can seldom be adhered to because of management decisions in

Range condition goals for range sites under consideration for vegetation manipulation should be agreed upon, since a judgment as to whether a specific vegetation manipulation technique has a positive or negative impact must be made in terms of established goals.

Historical Vegetative Changes Set the Stage

A general trend in vegetation change which has occurred on western U.S. rangelands since the late 1800's has been for an increase of woody plant species on many range sites compared to herbaceous species. Among the major woody species which have increased greatly on western ranges are sagebrush, pinyon, juniper, mesquite, and numerous cacti species. These plants have been mentioned by previous speakers. We have the alternative of accepting the current trend or directing at least some of the changes toward established goals. Manipulating this trend is not an easy task.

The increase in woody plants on the Jornada Experimental Range in New Mexico is well documented from 1858 to 1963 in a report by Buffington and Herbel. In 1885, 57.9 percent of the range was free of shrubs such as creosotebush, tarbush, and mesquite. This area free of shrubs was only 24.5 percent in 1915, 22.7 percent in 1928, and there was no area free of these woody species in 1963. A similar change from grass to mesquite cover was documented photographically in 1903 and 1941 photos on the Santa Rita Experimental Range by the USDA Forest Service and published by Stoddart, Smith and Box in 1975. The increase in woody vegetation in the Southwestern United States is also well documented in "The Changing Mile" by Hastings and Turner and "The Desert Grassland" by Humphrey.

The causes for the increase in woody plants on much of the western range are not easily identified, and it is likely that different causes or interactions of several factors have had greater effects on some sites than on other sites. Hastings and Turner seem to favor climatic changes along with excessive livestock numbers of the late 1800's for the increase in brush in southern Arizona. Humphrey gave more credit to the reduction of natural fires on rangelands and high livestock

competition to brush seedlings which become established, and remove herbaceous vegetation which could carry a fire.

The trend toward woody vegetation is a continuing problem. Cable and Martin showed mesquite density on a desert grassland area near Sonoita, Arizona, to increase from 12.7 plants/acre in 1949 to 33.3 plants per acre in 1970. The plants were all less than 3 feet tall in 1949 and the nearest seed source was one-half mile from the plots.

The reduction of herbaceous plant understory as influenced by woody plants is well documented. Arnold, Jameson and Reid showed that pinyon and juniper cover is continuing to increase on many northern Arizona range sites, and this increased juniper cover greatly affects the understory herbaceous vegetation. Herbage production averaged 600 pounds per acre when no pinyon and juniper were present, was 300 pounds with 20 percent tree canopy and less than 50 pounds per acre with 80 percent tree canopy.

On dry western rangelands, a major cause for a decreased herbaceous cover associated with woody plants is that the shrubs are effective in utilizing high amounts of available water, thus reducing the water available for herbaceous plant growth. An example of water use by mesquite is shown by a study of 15- to 19-foot tall mesquite on the Santa Rita Experimental Range from June 1971 to June 1972, a year when 16 inches of rainfall was recorded at the study site. Water used by mesquite in the volume of soil surrounding the plant to a radius of about 65 feet and a depth of 21 feet was an average of near 60 gallons of water used per day over the year. This water used by mesquite is inefficient for forage production and soil protection.

Once mesquite has become established on a range site it will persist, as the shrubs compete well for moisture. They sprout if only their tops are destroyed, and the plants with stems greater than 2 inches in diameter are resistant to fire.

Vegetative changes on many western range sites have been noted and continue to occur, and some type of vegetative manipulation is necessary unless we are willing to accept brushy range as our management goal.

Fire

Since the removal of natural fires from rangeland is often given as a reason for the increase in woody vegetation on western ranges, it is logical to look to fire as a tool for manipulating vegetation. For nonsprouting shrubs such as sagebrush, fire is a very effective control method, but with sprouting plants such as mesquite, repeated burning becomes necessary to kill even young plants. Cable in 1961 found a range grass fire killed only two-thirds of the mesquite seedlings less than a year old and 4 to 6 inches tall. All plants were top killed but one-third of the plants sprouted at the base.

As the influence of fire becomes better understood, we likely will use fire more for rangeland vegetation manipulation. Negative aspects of fire are that smoke during a fire and the appearance after a fire are objectionable to many people, and frequent burns are not

the effect of occasional fires on most soils, however, has not been great with the exception of some soils, which become hydrophobic after hot fires. Some nitrogen and sulfur is lost from a range ecosystem with burning, but the effect on vegetation and soil is usually small.

In Arizona Chaparral, fire in combination with chemicals shows promise of increasing water yield in a habitat short on open water, creating vegetation diversity which favors many wildlife species, increases livestock grazing capacity, and serves to manage fuel to prevent catastrophic burns.

Fire is a good tool for vegetative manipulation in many situations. It is not, however, the answer for all situations.

Mechanical Methods

For mature brush stands where there is little herbaceous fuel and there is a need for seedbed preparation in which one or more plant species may be seeded into the system, mechanical methods of vegetative manipulation are the most likely choice for most sites. Mechanical methods of vegetation control can be very effective and the treatment area can be well controlled.

The greatest negative aspect of mechanical methods is a high fuel energy input and high dollar cost. Costs of \$20 to \$50 or more per acre may be needed for mechanical vegetative manipulation. As an example, if we assume a cost of \$30 per acre to change vegetation on a range site which has the potential to improve from an initial livestock grazing capacity of 5 animal units per section on poor range to 20 animal units per section on an improved range, an increase of 15 animal units per section is realized at a cost of \$19,200 per section or \$1,280 per increased animal unit. At 10 percent interest and a 20-year planning period, the annual net income per animal unit would have to be about \$150 per animal unit if the costs are to be covered by livestock alone. Other values, such as soil stability and improved habitat for specific wildlife species, might be associated with the change, and these values also should be assessed a portion of the cost.

Chemical Methods

Chemical control of woody plants on rangeland has been effective. On the Santa Rita Experimental Range, livestock grazing capacity was increased from 10.2 head per section in 1954 to 27.4 head per section by killing mesquite with diesel fuel and implementing a grazing system with 40 percent utilization and alternate summer deferment of grazing.

Diesel oil treatment requires much hand labor and is expensive if mesquite are dense. A gallon of diesel fuel will treat only four to eight trees and this fuel is now expensive.

Martin reports that aerial applications of 2,4,5-T which killed 50 to 60 percent of the mesquite plants and 90 percent top kill in 1954 and 1955 were still providing increased forage in 1974. The herbicide would not need to be used often in a control program on mesquite.

Selective treatment of target plants with soil applied

desired vegetation mixes. Grazing or browsing animals are selective for specific plants. Selectively weeding out the nondesirable plants in range vegetation by use of selective chemicals is a method to help balance the system to desirable species.

Controlled Grazing

Livestock and wildlife species selectivity for specific plants changes over seasons and among animals. Some vegetative manipulation can be accomplished by manipulating animal use. For most of the major woody species problems, such as mesquite and juniper, however, there is no apparent grazing treatment to control these species. Grazing management may improve herbaceous cover and vigor up to the limit imposed by the woody overstory, but as the overstory increases, the increased improvement in herbaceous plants attained by management may be lost.

Management of livestock, wild horses and burros, and wildlife, must be an integral part of any vegetation

manipulation program. The cost is high for changing vegetation to meet demands. Management of uses is necessary to extend the longevity of the vegetation attained with manipulation techniques.

Conclusion

Historical and continuing vegetative changes on rangelands create a situation where many range sites are dominated by woody plants and will continue to remain this way without substantial vegetative manipulation efforts. Any vegetative manipulation, regardless of methods used, results in changes which favor some products and values and harms other products or values. Thus, conflicts arise because the goals of special interest groups and individuals are not the same. Rangeland policy for the future must stress establishment of realistic goals to meet product demands and values from the rangelands.

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RANGE MANAGEMENT, AN ECOLOGICAL ART

By

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The early rancher viewed himself as a free spirit who tended his herds and flocks on a limitless sea of grass. His thoughts were on his livestock with little concern for the perishable nature of his basic resource. He no more tried to manage the rangeland, seemingly so vast and immutable, than the sea captain, under stress of storm, tried to manage the ocean instead of tending his ship. Needless to say, such views no longer prevail.

The evidence is all around us that our range resources are neither limitless nor immutable. It is clear to everyone that careful management is necessary and that the penalty for failing to do so is great. It is also clear that, with modern knowledge and modern technology, human ingenuity is equal to the task of doing a proper management job. We need only the resolution and determination to do what needs to be done. The American rancher is well known to have these characteristics in good measure. Indeed, the rancher now fully recognizes that his primary occupation is husbandry of the range and that tending his livestock is secondary. Thus has the spirited cowboy, famed in legend and song, become in the end a humble grower of grass.

The range manager is a practicing ecologist. His practices are based on an understanding and appreciation of the ecological interactions of his grazing operations with the plants and animals of the range and with the physical environment. The science of range management was formerly called range ecology. The range manager was a pioneer in the application of ecological principles in resource management and his ideas have spread to other fields under such terminology as "Systems Concept" and "Integrated Pest Management."

Unlike the farmer who can cut down the forest or irrigate the desert to create a man-made ecosystem, the range manager must deal with the system that is there. He cannot afford to create an entirely new set of conditions by such costly means. The low yield of rangeland dictates that more subtle means be employed. It is the frustration and challenge, but indeed also the beauty and reward of range management to conserve and enhance resources not by massive action but by the skilled redirection of natural forces.

The range manager is limited to low-cost measures, yet the changes he needs to bring about are often great.

cost little but have a great effect. This means that he must employ the natural forces already at work in the ecosystem. By such means, the Dutch dike builder slows the current with well-placed willow twigs and harnesses a river to build a barrier against itself. Likewise, a brushfire can change range conditions beyond all proportion to the cost of the match to start it.

Changes in grazing practices, relocation of fences, additional watering places, and other low-cost practices may have beneficial effects far greater than their cost. Such seemingly minor changes can redirect natural forces to mend, repair, and enhance range conditions. Such measures may be the only ones the rancher can afford, or indeed may be the only ones that work.

The single overwhelming ecological fact of range management is that grazing animals selectively harvest forage plants and leave nonforage species to prosper undamaged. The consequence is the decline of forage species and the increase in unpalatable, poisonous, and noxious species. There are numerous ways to soften the impact of selective harvest, most of them having to do one way or another with conservative utilization. Forage species tolerate moderate grazing and in some instances benefit from it. Nevertheless, anything approaching full forage utilization leads inevitably to the increase in weedy vegetation, particularly small woody plants or brush.

Brush is the mortal enemy of the range manager whether his interests are livestock production, wildlife habitat, watershed, or general recreational use. Of the billion acres of range and pasture land in the U.S.A., about a third appears to be infested with undesirable woody plants. The principal species include chamise, manzanita, sagebrush, rabbitbrush, southern blackbrush, broomweed creosotebush, yellow pine, cactus, juniper, acacia, mesquite, aspen, scruboak, snowberry, wild rose yucca, and agave. These plants decrease forage production, reduce water yield on watersheds, and when present in dense stands impair wildlife habitat and virtually eliminate the recreational use of land. The end product may be brush so thick that nothing of value can be produced.

Such conditions are often preventable by a combination of hand methods, fire, and grazing management.

Once brush is fully established, major reclamation programs provide the only answer, and these call for fire, machine methods or chemicals, or combinations of these along with reseeding and other supportive technology. The specific methods in each case depend upon local conditions, but the trend is increasingly toward the use of herbicides in preference to mechanical methods and fire although combinations of chemicals with the other methods are appropriate in many cases.

It is so popular in these days of environmental awareness to be opposed to herbicides and other pesticides as pollutants, that it takes courage to advocate their use, particularly on forests, ranges, and watersheds where livestock, wildlife, and streams are exposed. Nevertheless, whether or not we advocate or deplore the use of chemicals is immaterial. Like other practices, herbicides will succeed or fail on their own merits. Their position in range management is constantly being tested in practice. By this means, sound technology including herbicides is evaluated, accepted, and used. Inefficient or hazardous technology is rejected by a complex system of decisionmaking involving individuals, regulatory agencies, and the courts. There is much waste motion in the process, and occasional steps backwards, but there is every evidence that the trend toward chemical weed control will continue.

Herbicides afford the opportunity to selectively suppress brush and other weedy species with little injury to desirable plants and wildlife. Present chemicals fall short of the ideal in many ways but are far more selective and environmentally more acceptable than fire and the bulldozer. The number and kinds of herbicides available for range management continue to increase, and a number of factors, including the rising cost of fuel and labor, increasingly favor their use.

We have numerous tools and a wealth of research information useful in range management that were not available a generation ago. There is no evidence that the scientific age has come to an end nor that the next generation of discoveries will be any less than the past. On the contrary, with reasonable support and an atmo-

sphere of government encouragement we can expect far greater advances in the future. We need to seek better range management technology with unflagging determination. This should be the cornerstone of national range management policy.

In conclusion, it seems to me that we have a better understanding of range problems, better means of solving them than ever before. We have a greater appreciation of the need to conserve and enhance our range resources and a higher commitment to take appropriate action. Surely we should expect to see on every hand a veritable whirlwind of activity in range improvement. This should be particularly true at the Federal level where the vast national holdings of rangelands could well be managed in a manner exemplary to all and as a model to private landholders. Instead of this we see quite the contrary: business as usual, or declining interest in range problems.

At a time for decisions we have instead a paralysis of decisionmaking. When the need is for action we do paperwork instead. We are informed at the meeting that Environmental Impact Statements now completed, in preparation or planned, may involve Federal expenditures in excess of \$500 million. At \$100 per page this becomes an aggregate document of more than 100 million pages; enough, with proper covers, to fill a bookshelf over 5 miles long. This is pure busywork carried out in the name of decisionmaking, but serving only to divert energy, attention and effort from management functions to useless paper work.

It is to the credit of the hardworking executives of the Forest Service and Bureau of Land Management that they personally neither write these things nor read them. It is now well understood that the preparation of Environmental Impact Statements is an industry within itself that has little to do with decisionmaking. It is an industry that is all form and no substance. The reports are prepared, reproduced, circulated, and filed by persons having little to do with real operations in the real world.

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PANEL V

THE FUTURE

THE FUTURE

By

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Resources for the Future is the organization that I work for. It is a nonprofit research organization in Washington, D.C. We try to be non-partisan, and we try to investigate national resources questions in an objective fashion. We are supported by foundations, by government grants and contracts, and by private industry. I've been asked to announce that registration is open this morning, and you do need to register if you wish to receive the proceedings. So, we would urge those people who have not registered to please register.

This has been a most interesting conference for me. Prior to moving to Washington, D.C. about 3 years ago, I spent 21 years in Oregon. During the first part of my stay in Oregon I did research on range management questions, and prior to that I had some academic training in range management at Kansas State University. I took my training under such people as Cling Anderson, H.H. Lodge, F.D. Ferrell. Those names will be familiar to many of you, I'm sure. But in recent years, probably during the past 15 years, I've not really been close to range management questions.

I came to this conference expecting to be snowed under with a lot of new concepts and a lot of new ideas. Now, to be sure, a lot of new things have come up that I was not as familiar with as I might be. Many of the questions concerning pesticides, remote sensing, and computer modeling are all relatively new as applied to range management as far as I am concerned. And I think that a number of new environmental interests showing public concern about the way that the range is managed is a new development. On the other hand, there are a lot of things that are not new. I would say that the questions puzzling range management 15 years ago are still questions that are very much concerning people today, as reflected by this conference.

I have made a list of some of these questions that have come up during the course of this conference, and I'm going to go over those questions at this point. Although these questions haven't been answered in this conference, the conference isn't over, and we have four panelists here who are going to answer these questions before we finish this morning.

Although range conditions have generally improved,

between the economic and the biological optimum? And is this not likely to be the case for some time to come? If this is so, how useful is the biological potential? As a major performance on the rangelands? That's one question, and that question was around 25 or 30 years ago. But we're going to answer it this morning.

Natural conditions influencing range productivity are not the same every year, and rangeland must be managed over time rather than just on the average. This complicates management greatly, and this is especially true when commercial and noncommercial species are in competition for the . . . vegetation. How does one manage the range to minimize this conflict? I think that this has been neglected at this conference until now, but we are going to get it answered before noon.

There is still considerable confusion about how multiple use is to be accomplished as public policy. But this confusion did not stop Congress from decreeing that multiple use is to prevail on the rangelands. This gives rise to an exceedingly difficult question which I would like to phrase as follows.

This conference has established that up to a point, it may be possible to increase production of both commercial and noncommercial rangeland uses, but that sooner or later they will become competitive.

The conference has not established how the combination of commercial and noncommercial uses will be decided upon when competition exists. At least four methods have been advised. And I'd say these are methods or prophecies. There are at least four. There may be more, but there have been at least four methods advanced.

1. To maximize the commercial values. To the extent that other values do not interfere, these can be added. Now this might be the sort of thing you would expect a private land manager to do, but it has been suggested also that this might prevail on the public lands.
2. Another method is to maximize the noncommercial values. To the extent that commercial values do not interfere these can be added.
3. Another method is to maximize the economic value of the range by assigning market values to

And still a fourth method is to use political criteria to determine the combination of uses on the public rangeland. Here one might do whatever is necessary to minimize conflict. Now, I would say to our panelists this morning that the conference has raised these kinds of questions but has not answered them or faced them directly. My question is, then, is there an inherent problem in the law under which we are operating, that on the one hand seems to mandate efficiency and urge use, but on the other hand insists that public participation is going to prevail throughout the decision process? My question is whether or not these comprise an inherently consistent philosophy?

The way that we will proceed this morning is for our four panelists to make very short presentations, probably in the nature of 5 minutes each. We will then take questions from the audience until time for a break,

around 10:00 o'clock. We will then break and return and at that point, the panelists will then again have the opportunity to make very short presentations. We will then have additional questions from the audience.

Before turning to the first panelist I would like to establish what I hope will be the ground rules during the question and answer period. We hope that you truly will ask questions, and not make statements of your own. If you wish to have a statement considered for the record, if you will write that out and submit that to me, we will see that it does get into the record and that it is considered. But we want to devote as much time as possible to true questions. If you want to make a statement, you may want to spend some time preparing the statement so that it can be given to me in written form. The same is true of your questions if you want them to be in the record.

THE FUTURE

By

Frank Gregg, Director
Bureau of Land Management

On previous panels we had four or five people who could not agree about either the past or the present. I think the best indication of the quality of this panel is that it only takes four or five of us to reach firm agreement on the nature of the future. There is a certain certitude that comes once you become the director of an agency. When pondering the future, it strikes me that we can agree about it as long as it is distant enough. It is not at all clear, however, that we can reach a workable agreement about the immediate future.

Insofar as the lands under the jurisdiction of the Bureau of Land Management are concerned, the question is not where we are going, but where we begin. We are now in the process of preparing grazing environmental impact statements, which pose the issues more sharply than they have ever been posed before.

After a lot of discussion about the scientific, political, and economic future of the public rangelands, we are right back where we started from. The bottom line is, how do you set initial stocking rates, and through what process are we going to adjust the use of the range resources as we pursue our management responsibilities?

A second and closely related question is, how do you measure success in range management? That brings up a third question, have we properly defined success? If livestock operators define success as being able to avoid cuts in livestock grazing where good scientific evidence indicates that cuts should be made, we are in trouble. If wildlife managers and environmentalists define success in terms of the number of livestock reductions they can get, we are equally in trouble.

That somewhat stark conclusion arises from my own conviction that we simply have to develop an effective political coalition of western rangeland users if we can hope to compete successfully for public support and for the resources. We will need to do the best possible range management job for the people of the United States.

I think we can predict much of the discussion that will be going on at the grassroots level over the next few years. To a substantial degree, it will be the same dialogue we have been hearing for the past 30 to 40 years. Over and over we will be told that cutting the number of livestock will, of itself, do little to improve the range. We have been through all of this before, but

cated grazing system will not improve the range if the degree of use is wrong.

So it seems to me that we are almost back to ground zero. What we are really talking about is whether we can win the confidence of range user groups and the communities affected by range use with a management process in which (1) the users and the community can reasonably expect us to consider honestly their interests and (2) we can show that we have the resources necessary to provide an on-the-ground management system that will produce results.

There is a clear message here for environmental organizations as well. We must accept the fact that management, even intensive management, is good and that the decision to allocate resources, even specific resources to specific uses, is a management decision, an overall part of the management program—not something to be avoided at all cost.

There are several other problems we must face as Federal administrators of the public range that I want at least to surface.

First, several people have pointed out that money is the key to range improvement. I think it is important to note that in light of a strong, clear legislative mandate to improve the Federal range, funding performance over the next 2 or 3 years is going to set the boundaries of what it is possible to accomplish. Unless we get the funds within this time frame to allow us to set up a reasonable schedule of expenditures, I question that we will be able to accomplish what needs to be done in the foreseeable future. I think we need to demonstrate some results, and quite soon. A part of our strategy ought to be to document early the benefits of past and ongoing programs.

We are going to have to recognize hard facts and make some hard decisions about the forage we allot for uses other than livestock. It is quite appropriate for the livestock interests to challenge us for not being as critical about accepting opinions concerning optimum numbers of game animals and wild horses as we are about accepting their estimates about optimum numbers of livestock.

That brings me to my second point. One key factor in better rangeland management that we have not discussed very much today is the role of State govern-

toward the controversy surrounding the management of public lands. In many cases they tend to be detached, and when not detached, they tend to cast themselves in an adversary role. I think it is fair to say that historically when the issue is drawn between the Bureau and the livestock industry, the States have been quick to portray the Federal Government in the role of the villain who is out to do bad things that will bring ruin to the livestock industry in their State.

I hope this will change, and I hope that we will make it a deliberate objective to see that it does change.

State governments are not like they were a long time ago. Generally, they are well staffed in most of the natural resource disciplines. Their programs are well organized, not only in fish and game departments, but pretty much across the board. We are encouraged with the professionalism we find among the various State agencies. I am vastly encouraged by Governor Evan's initiative in setting up a Rangeland Subcommittee of the National Governors' Conference. I think it is an im-

mensely encouraging sign that we have the beginnings for fine resource leadership in the State governments and the potential for State participation as we attempt to find answers to our real problems.

The last problem we will solve is the matter of intermingled ownerships. This is a particular agony for BLM which must deal with scattered land use patterns across many of the railroad grant lands. A particularly difficult problem is to manage intermingled Federal and State school lands where legislative responsibilities are different.

Finally, let me note in closing that many of the fundamental stumbling blocks to comprehensive rangelands management are not sweeping philosophical issues, but ticklish technical and methodological differences. I want you to know that we intend to achieve agreement on each of these differences during the coming year and that we will hold a steady series of workshops to find these answers so we can get on with the business of managing the Nation's rangelands.

RANGELAND POLICIES FOR THE FUTURE

By

R. M. Davis

Administrator, Soil Conservation Service

The Soil Conservation Service (SCS) is the major range technical assistance agency of the Department of Agriculture (USDA) as far as the non-Federal sector is concerned. We are involved with about a half a billion acres of native grazing lands (rangelands, grazable woodlands, and native pasture) which are subject to our range conservation technical assistance activity and other programs.

SCS has a corps of highly trained range professionals that provide this assistance to non-Federal range owners and users. Included are almost 300 employees classified as range conservationists and an equal number of range educated and trained people classified in other categories. A high proportion of the latter group are district conservationists and other field office personnel located in range areas. A major portion of their job is to render range conservation assistance to land users.

We deliver our range technical assistance primarily through conservation districts which are local units of government. We have a "partnership" relationship with these districts to assist cooperating range owners and operators.

SCS *does not* manage rangelands (or other lands for that matter) except for a number of plant materials centers. The owner or user is the *manager*. He or she makes the final decision as to land use and treatment. We provide range expertise to assist him or her consider the viable alternatives that will achieve their objectives and conserve soil, water, vegetation, and other resources.

Our range assistance is based on ecological principles. Over the past 30 years or so we were instrumental in developing an ecological approach to rangeland inventory. This is known as the "range site and range condition" method. It is now widely used in the U.S. and in many foreign countries.

We have no direct responsibilities on Federal rangelands. However, we do cooperate closely with the Forest Service, BLM, and other Federal and State agencies in

coordinated resource planning in areas of intermingled Federal-non-Federal land ownership. We are a signatory party, along with Forest Service and BLM, to a 3-agency agreement on this subject. We also cooperate with these plus other agencies on common range standards, soil surveys, inventory methodology and procedures, and other activities that impact on all rangelands. I am quite proud of our "track record" on coordination and cooperation with other agencies and organizations on mutual range matters.

SCS does not conduct range research. We are, however, a *major* client of SEA-Agricultural Research, Forest Service, State Experiment Stations, and others that do carry out this research. We actively participate with the research community to develop range research needs and implement new knowledge as it becomes available. Our range technical assistance activity is a major element of technology transfer in the range arena.

The SCS range policy is included in our "National Range Handbook" issued in 1976. It also contains our procedures, techniques, and other items. Some specific policy items that it addresses are:

- Goals—"The overall goal of SCS for native grazing land is to manage the land according to quality standards to meet needs for livestock production, watershed protection, wildlife management, recreation, and other goals."
- "It is the policy of SCS to maintain high standards of technical quality in all activities related to grazing land."
- "Assistance to users. To achieve conservation objectives for individual operating units, SCS assists users of native grazing land in developing and implementing their conservation plans on the basis of a scientific inventory of soil, water, plant, and wildlife habitat resources. The objective is to help all users of native grazing land become conservationists. . . ."

Many other policy items are included. This handbook was developed with input from many agencies and organizations outside of SCS. We not only welcome your review and suggestions on the policy and technical material that it contains but sincerely solicit it as we attempt to determine "rangeland policies for the future."

THE FUTURE OF RANGE MANAGEMENT

By

John R. McGuire, Chief
Forest Service

Range programs in the Forest Service run the full gamut of functions, including range research, cooperative assistance to the States and private landowners, and, more prominently, management of some 100 million acres of rangeland in the National Forests and Grasslands.

The Forest Service has had that last function—direct range management—since 1905, the year we were formally established in the Department of Agriculture. In looking back over that 74-year period, I take a great deal of pride in the pioneering work of those first few thousand Forest Service range managers.

Those people started from scratch, so to speak, in setting up a management program on public range. And they helped define the art and science of good range management, and then apply it on the ground. These people took the knowledge that came out of research, plus the practical knowledge and experience that already existed, and began a program of range management as they perceived it.

In looking back, I think that we all agree that some better efforts might have resulted in better stewardship of National Forest System lands. But on the other hand, the fact is that two-thirds of the rangeland in the National Forest System is in satisfactory or better condition.

That good work is the product of the efforts of many people, not just the Federal Government. The trend is toward still further improvement in the condition of these rangelands; I'm very optimistic about the future of rangeland management in the National Forest System, as well as for the range research and cooperative range programs in which we are involved.

In our resources planning under the Forest and Rangeland Renewable Resources Planning Act—the RPA—we have substantiated a continuing demand for forage to support livestock and populations of wildlife on the National Forests and National Grasslands, as

part of increased demands for all natural resources in the United States.

These National Forests and Grasslands can do their share in meeting these demands, provided they can be managed to produce at higher levels than they are producing today.

We recognize that individual farmers and ranchers, as well as the communities of which they are a part, must be able to rely upon these National Forests and Grasslands for livestock grazing. Close coordination between the Forest Service, Soil Conservation Service, and other agencies, plus the private land owners, is essential to assure that management of Federal lands is effectively coordinated with that of associated private lands.

The degree to which we can provide future livestock grazing depends not only upon demand from the farmer and rancher; it will depend also upon the extent to which grazing use is competitive and compatible with the other demands upon these range lands—both public and private.

It will depend upon our ability to work out acceptable solutions to complex problems, such as enhancing the energy efficiency of rangeland management.

And it will require an expansion of our research efforts into the complex area of multiresource management decisionmaking—to enhance our capabilities in planning for an optimum mix of resource uses.

To conclude, I believe that range livestock grazing should have an increasing role in Federal land management. However, we must first correct the remaining problem of long-standing range deterioration. And we must accommodate the growing public demands for other resource uses as well.

The future of livestock grazing can be assured if we can arrive at a proper resource allocation under careful and objective planning. And I do believe that can be done.

RANGELAND POLICIES IN THE FUTURE

By

Anson Bertrand, Director
Science and Education Administration

In the 1960's, futurists were envisioning farmers sitting in computerized houses, operating automated tractors remotely, their wives wearing disposable clothing made of paper. The realities of the seventies have changed all that. The fluctuating weather patterns with drought and increasing desertification of the world's grazing lands and the oil embargo have drastically influenced the outlook for the future. The gravity of the world food situation, the finiteness of our land and water resources, and the impact of overuse and erosion of lands on the environment have highlighted the need for the United States to reassess its priorities and policies concerning rangelands.

The West and Great Plains contain some 25 large groups of ecosystems. Many different groups of people use each of these ecosystems for a variety of purposes—some of them conflicting. The complexity and diversity of the rangeland resource emphasizes the need for effective communication among all facets of the human community. The Science and Education Administration of the U.S. Department of Agriculture was organized to enhance that communication link. A long-term multidisciplinary research effort involving the States and different Federal agencies is one of the keys to future availability of rangeland resources for production of food, forage, and fiber, as well as providing other resources and services for man's well-being. The transfer of accumulated knowledge into practical use by the consuming public is another key that cannot be overlooked.

As the human population increases, food needs will also increase, including continuing need for red meat and milk as a source of protein food in the United States and the world. The availability of feed grains for livestock production at a reasonable cost will decrease, which will ultimately alter the numbers and types of livestock produced. Production from ruminant animals, namely, cattle and sheep, will likely increase since they are uniquely capable of utilizing nutrients from forage plants grown on land unsuited to the production of vegetable and grain crops for direct human consumption.

The harvesting of range forage by grazing livestock is

Land available for agricultural purposes, as well as recreation, wildlife habitats, and many other uses will decrease under the continuing pressures of population and energy development.

Research is critically needed in a number of areas. These include an increase in the effectiveness of soil and water conservation and an increase in the efficiency of water use. Ninety percent of the rangelands in the West are in class 6 and 7 lands. The sparse vegetation and impermeable and shallow soils on these sites account for large amounts of runoff and high sediment yields. Our knowledge about such effects is limited and makes it imperative that we learn more about the relationship between soil erosion and quality of runoff water under different management schemes.

The two primary factors influencing plant growth and development under rangeland conditions are water and temperature. Water may soon outrank land as a major constraint to U.S. food production because of the rapid depletion of ground water reserves in the West, Southwest, and the Great Plains. Most of the western agricultural, industrial, and municipal water needs are met by runoff from range and forest lands.

As energy and water shortages become increasingly acute, what will be the environmental consequences of a greater use of pasture, forage, and rangelands, in livestock production systems? To what extent will the increasing human demands for recreation, wilderness areas, and urban development encroach on the use of lands for agricultural purposes or vice versa? Recent water legislation requires that the impact of range management on the quality of water from rangelands be identified. Our lack of knowledge on this topic must be overcome. The Resource Conservation Act requires the assessment of all our conservation programs.

Range plants are under severe conditions of stress much of the time due to lack of water and temperature extremes. However, the potential exists to genetically select plants that are better adapted to such environmental stresses. We have not fully exploited that potential to date.

Weed and brush control continues to be a top-priority problem in the management of rangelands. Improved

to which improved plant germplasm with pest resistance and other methods of biological control of pests become available will largely depend upon our research investment in these areas.

We need to assess the economic and social factors that will result from a shift from the current grain- and grass-fed livestock production system to a predominantly grass-fed livestock system. The human nutritional implications associated with lean meats may be a positive factor associated with the potential shift from grain-fed to grass-fed livestock.

A major range research planning effort has been underway within Agricultural Research of the Science and Education Administration. Phase I of the effort has been an in-house assessment of their current range research program and the identification of problems and research needs. Phase II will involve interaction with other agencies and States, as well as the public and scientific community. We look forward to such an activity and are dedicated to establishing a firm basis for strengthening the planning, evaluation, and coordination of our research, education, and extension efforts on rangelands in the future.

QUESTIONS FROM AUDIENCE AND RESPONSES

Responses to questions formally submitted at the Symposium are presented in this section.

Question:

I would like to preface my question with a generalized statement. Biologically, rangeland condition in many areas is held in a stasis category by the presence of shrubs—shrubs which initiated growth from 40 to 80 years, and in some cases, well over a century ago, and which can be expected to exist for another 40 to 80 or more years into the future until they are finally lost through maturity, stagnation, and eventually death. I would like answers from the Forest Service, the Soil Conservation Service, and the Bureau of Land Management as well, on the following question.

What is the means of hastening biological dynamism to eliminate the community-controlling function of shrubs, as engendered in the FS, SCS, and BLM philosophy of range improvement concepts that will be advocated to increase rangeland condition in the near future? (Herb Fisser)

Response:

The policies of the three agencies are quite uniform on this subject.

First, we must determine if the shrubs in question have actually invaded the site as a result of past and present management activities, or if they are indigenous to the site.

The U.S. Department of Agriculture and the U.S. Department of the Interior, as a policy, subscribe to shrub control where needed for grassland restoration—in other words, where the shrubs have invaded. The SCS has for many years supported this policy position for private lands through an active program of technical and financial assistance to the private landowner for controlling shrubs to reduce erosion or for restoration of the vegetation cover. This does not include what is often referred to as type conversions. The SCS also provides assistance to reduce the density of brush on sites where it is native, but is present in amounts significantly in excess of that which is normal for the site. This is SCS policy. It is also FS and BLM policy for the Federal lands they administer. Of course, there have been many slips between policy and application on the land. Hopefully, we are approaching that kind of management and technical assistance.

Ideally, in brush management, we consider soils, climate, and the ecological significance to wildlife of the species to be controlled, as well as what the site is doing

Of course, economics and practical aspects often modify what we would like to see applied on the landscape.

Obviously, there are several means or methods of hastening or facilitating restoration of climax grasslands which have been invaded by shrubs. Traditionally, most brush management has been by use of selective herbicides or mechanical equipment. Because of the increasing environmental constraints on the use of herbicides and the escalating expense of mechanical measures, the use of these two methods will likely decrease in the future. In their stead, we expect to see all three agencies make increasing use of prescribed burning, biological control agents, and various combinations of methods. We are looking to research agencies and institutions for a lot of help in this area.

We also believe proper grazing use and planned grazing systems which promote a healthy, vigorous cover of herbaceous vegetation are a necessary and effective component of hastening range improvement. Finally, it goes without saying, employees of all three agencies who manage rangeland or provide technical assistance on shrub management are directed to consider all components of the ecosystem, both flora and fauna.

(Phillip L. Sims and representatives of BLM, FS, and SCS)

Question:

Why do we still use the climax concept as a basis or point of departure for determining range condition and trend? Climax condition is difficult, if not impossible, to determine on many sites. Years ago, I defined range improvement as the process of replacing a relatively undesirable population of plants with more desirable types—desirable for domestic and wild animals for both forage and cover. If the vegetative cover is improving year by year, the condition trend is upward. If the vegetative cover is deteriorating, management changes are called for. (R. Merton Love)

Response:

I believe the climax concept is used as the philosophical base for judging range conditions and trends because the climax community provides a uniform base against which changes in the range site can be noted, regardless of the cause of the change. Further, condition classes

ready interpretations of value to experts in many disciplines. This latter consideration is especially important in this day and age where so many people with diverse interests and expertise are interested in the range.

An alternative to the climax concept is the desirable plant concept you mentioned. The big question immediately arises, "desirable for what?" Plants desirable for sheep are not necessarily desirable for cattle; those desirable for horses may not be desirable for goats, or elk or deer, and so on. I believe condition classes based upon this concept would provide for fewer opportunities for interpretation by other disciplines than do those developed under the climax concept. (Thad Box)

Question:

Statement has been made, and most seemed to agree, that range has improved from early years of this century as well as the last couple decades.

Brush intrusions appear to be increasing.

Is brush control an exception to the statement, or is brush intrusion included in the general statement that overall, range condition is improving? (Earl Pingry)

Response:

Brush encroachment, though a serious problem in many areas, is no exception to the statement concerning improving range condition. According to brush surveys on non-Federal rangelands by SCS, there was virtually no difference in total brush in 1963 and 1973—a decrease of less than one-half of 1 percent. Even though SCS was assisting with about 4 million acres of brush management per year, ranchers were just managing to hold the line on total area of brush. There was, however, a significant change in brush density between 1963 and 1973. By 1973, the sparse stand had increased about 13 million acres or 15 percent. The dense had decreased almost 17 million acres or 15.5 percent. The stands of medium density remained virtually unchanged—an increase of about 3 percent. (SCS).

Question:

Are we prepared to apply range management principles to control wildlife (particularly big game) numbers as we do to control numbers of livestock? I recall a chart in one of Marion Clawson's early books on the western range. Briefly, as livestock Animal Unit Months (AUM's) were reduced on BLM allotments in order to reduce the amount of overgrazing, numbers of big game animals surged to take up the slack. In effect, the range continued to deteriorate and the livestock owners suffered. Ways and means must be sought to keep both domestic and wild animal numbers in balance with the vegetation. (R. Merton Love)

Response:

Big game populations have historically been controlled by sport hunting, under seasons and bag limits established by the State fish and game agencies. In our view, this approach has been generally successful in keeping game populations in balance with their habitat.

management. We support the continued use of this established system for wildlife management.

I might add that we also support professional management of feral horses and burros to keep their populations in check and in balance with the capacity of their range in an appropriate mix of feral horses and burros, wildlife, and domestic livestock. (Maitland Sharpe)

Question:

Because of potential environmentally negative consequences from forcing livestock operations out of business, maintaining existing livestock operations should be a high priority goal of the Federal Government.

Statements in the Challis EIS Supplement indicate BLM has expressed no such concern.

In many cases, the rancher's alternative to the preferred action in the Challis EIS, and in many other areas, is to sell out to developers.

The consequences of such development will severely reduce wildlife habitat. Bighorn Sheep on the East Fork, Salmon River, will be virtually eliminated by recreational subdivisions and their subsequent environment. Water quality and soil stability will be adversely impacted to a far greater extent by such development than by existing range activities.

Why are such factors not of concern to BLM? (David P. Tidwell)

Response:

The BLM is concerned with the trend toward subdivision and development of key tracts of private lands adjacent to public lands with sensitive resource values. This is an activity over which we have no control, and it has not been our experience that public land use decisions have been the controlling factor. The prices offered to owners of lands with subdivision values become too attractive, and the livestock operator eventually sells. (BLM)

Question:

What incentives does BLM provide permittees to participate and invest in improved management, range improvements, and long-term stewardship, when:

- a. No opportunity exists to regain any of the reduced AUM's until 15 years after the initiation of the proposed action, according to the EIS. Even then, regaining all the reduction is not addressed.
- b. The rancher's earning capabilities have been reduced by 30-60 percent through reductions in his permitted livestock.
- c. No commitment by BLM is made to ensure that needed range improvements will be implemented in a timely manner, often because of budget uncertainty. (David P. Tidwell)

Response:

It is in their best interest for permittees to continue to participate in activities which will help improve range-land conditions and productivity.

Implementation of management proposals and range

initiation, and increases in livestock may be allowed at any time after range conditions are shown to be improving and production of livestock forage is adequate for their support. This should not take 15 years. (BLM)

Question:

Why has BLM consistently resisted from including as an alternative stated in their Environmental Impact Statements, the application of appropriate management and range improvements without initiating reductions in livestock numbers? Such an approach, with voluntary livestock adjustments while implementing the plan, have proven successful in many areas throughout the West. (David P. Tidwell)

Response:

Our experience has been that imposing the most sophisticated grazing system, including any and all range improvements, will not improve the range if the degree of use is excessive. (BLM)

Question:

BLM Environmental Statement development influences State endowment lands intermingled with Federal lands as part of planning units. On the Challis Planning Unit in Idaho, BLM proposals will mean a loss of more than 60 percent of the forage available to the State's lessees on the more than 18,000 acres of State lands involved. Similar actions are being identified in other BLM planning units.

State endowment lands are governed by very strong Federal laws which have historically been upheld in the courts, including the U.S. Supreme Court.

In view of this, why do BLM Districts consistently disregard the need for coordination and cooperation with State land agencies and make unilateral decisions affecting State lands without authority? (David P. Tidwell)

Response:

Land use decisions for the Federal lands can influence to some extent the concurrent uses on intermingled lands whether State or private. It is BLM policy and in the Federal Lands Policy and Management Act that BLM not involve these other land values unless they are intermingled with public rangelands. Often lands of other ownerships are so intertwined that management is not possible without knowing the carrying capacity of all lands. It is not that we want to manage those State lands; it's the fact that management must be of the total to have management of any part. (BLM)

Question:

The figures I have in mind may not be correct, but my understanding is that the original estimate of cost for the 212 Environmental Impact Statements made neces-

was \$55 million, and that up to now, the 6 EIS's completed have cost \$275 million. Do you believe that the investment of this much time and money directly into range management and improvement efforts would have resulted in more environmental protection than the preparation of EIS's?

Have you had any second thoughts in regard to the action which brought these about? (John Merrill)

Response:

It is regrettable that the costs were so high, but it is felt that the information developed in the EIS's was needed by the BLM and the costs were warranted. Gregg stated that the court order was used to procure funds to obtain updated resource information, which was often beyond the requirements of the EIS orders. (Johanna Wald)

(Editor's Note: Further response to this question is contained within the following.)

Comments by Frank Gregg
Director, Bureau of Land Management

There has been some confusion on the question of whether the environmental impact statements (EIS's) are holding up any kind of action on the public land. That is not the case and has not been the case for months. In fact, long before I came to the Bureau in the fall of 1977, the Bureau instructed its field managers to identify those range improvements that the ranchers and the Bureau could make without running contrary to the rulings of the court.

The lawsuit does impose restrictions on certain kinds of range improvements before the EIS is completed, Johanna (Johanna Wald, Natural Resources Defense Council), but those relate specifically to the implementation of AMP's. Other range improvements can be made and we have spent a great deal of time and effort in discussions and seminars so our field people could distinguish between those improvements that are allowed and those prohibited.

There are many range improvements which can be made now and could have been allowed. I think, in all candor, we should tell you that in many cases the reason they have not been made is because our field people, who might otherwise be working on designing and organizing range improvements, are too busy writing (EIS's), planning, and their analyses.

On the question, "Is the EIS cost bearable?" I think that Johanna implied, and I want to make something clear, that there are a lot of additional expenditures in the process of preparing EIS's which should not be charged to the EIS process. The fact is, we did not have even the most fundamental information about many of the resources under our jurisdiction, and only very crude information about soil, vegetation, and wildlife habitat.

Quite sincerely, and I think quite intentionally and

OMB's and Congress' approval of funds needed to gather the information that we needed, not only to write responsible EIS's, but also to help us build up a data base that we need to make other decisions which may or may not have anything to do with grazing. So when you think about the cost of the EIS's, remember that we are getting basic information about BLM land that will help us for generations to come.

The information we are gathering about soil types will be used to make decisions about other management activities. We are making decisions, based on EIS's, that will result in improving the public rangelands.

We frequently meet with our field range and wildlife staffs to help our field managers prepare EIS's in the most economical way possible, to make decisions and to take actions based on what they find. I think one of the reasons that some get the impression there is a lack of guidance from Washington is because the statements are being prepared on entirely different data. In some cases we are able to do soil, vegetative, and wildlife habitat inventories. The methodology that we follow both for analysis and for decision in these cases is quite different from those cases where we are unable to make such inventories. That makes it difficult, because it means that in the early years of the EIS program we are not replicating a familiar process. We have to approach these cases in quite innovative ways, depending upon the quality of data that may be available for each individual area. The Bureau now has a clear picture of the information and methodological requirements for each of our range EIS areas.

We can now estimate what it is going to cost in time and money to finish each statement. We have ranked them according to priority, so that we can make the most effective use of the resources that we have available to us. It is my own judgment that the EIS program is under effective management. If any of you have any deep concerns about that, as a result of things that may have been said in the panel, I do not think such concern necessary.

However, we are not content with what we have, and we are constantly working to simplify the process. In fact, I have a task force working to find additional ways to cut the time required to prepare EIS's. As for the EIS itself, we see it as a constructive tool, we welcome it. We have used them to get the money we need to finance surveys and studies to tell us more about the resources that we have.

I urge you, all of you, whether you are environmentalists or whether your interests are in trying to make a living in raising livestock, to recognize that this process is useful to all of us. Let us use it as an honest, analytical system for trying to make the right kind of management decisions. We think that whatever the history of it was, and however irritating it may have been to some of you to have to address these issues in response to an NRDC lawsuit, the fact is, we have an opportunity. If we use it constructively, we will all be

Question:

Please furnish me with site specific information where domestic livestock grazing is to the detriment of wildlife.

In my area, the exact opposite is true. In western South Dakota, 236,000 acres of prairie dogs have displaced 60,000 AUM's of livestock grazing—both big game and domestic. (Pat Stout)

Response:

Information about impacts of livestock grazing upon wildlife can be found in several recent publications. We refer you to the following: BLM's report on "Impacts of Livestock Grazing in Nevada," BLM's Challis EIS, and the report from the Symposium on "Livestock Grazing in Riparian Stream Ecosystems." (Johanna Wald)

Question:

As an advisory board member of National fish and wildlife animal damage experts, how can we collect animal damages on private land from trespass of prairie dogs?

In Wisconsin I am aware of \$20,000 paid for deer damage in one apple orchard. Also, in marsh areas in the same State farmers are paid for their entire crops where ducks and geese eat them bordering this wildlife reserve. (Pat Stout)

Response:

The Federal Government does not pay for animal damages from prairie dogs or any other animal. The only means for payment would be for the State of South Dakota to pass legislation authorizing payment of damages. (FWS)

Question:

The program notes for Panel III mention, "Federal/State roles, economic constraints, financing, low-income groups." The Panel members have stressed needs for more research, more cost-sharing, more loan guarantees, low-interest loan programs, a "united front" for getting full funding for the Federal authorization in the grazing bill, more education programs, more technical assistance.

Governor Babbitt said that Arizona is 80 percent urban. California is about 95 percent urban. How are we going to convince the urban voter that grazing lands need to have a higher priority for funding than in the past—particularly in this era of cutting budgets? (Priscilla Grew)

Response:

From 1934 until 1976, the basic policy for managing our public lands was the Taylor Grazing Act, which stated that the public lands would be managed under this act until its final disposition. It was contemplated in

When the BLM Organic Act was passed in 1976, Congress said that the policy of the Federal Government was for this land to remain in Federal ownership. This changes the position from one of custodial management until disposition to one of permanent management.

I compare this to an old home. It has gone through the ravages of time. You've had tenants who have stripped the wall paper, and damaged the plumbing. Some of it is in pretty bad shape. Now you've decided you are not going to sell it, but you are going to keep it. If you are going to keep it you have an obligation to restore it. You have an obligation to put on a new roof, put in new plumbing, and a new heating system.

If you are going to charge the tenants of these public lands, which in our case is the ranchers, then you have an obligation to these lands. I think this is one approach we can take to our urban neighbors. "You've decided you are going to be our 'landlords'; now assume your responsibilities as 'landlords'." (Bill Swan)

Question:

If it was proven, beyond a shadow of a doubt, that the use of 2,4,5-T on rangeland guarantees dioxin contamination in the meat from livestock grazing on this same rangeland, would you still advocate its use? (Susan J. Parker)

Response:

Based on what is known about the environmental pathway of dioxin and any present or proposed use of 2,4,5-T, what you describe will not happen, yet I or anyone else will have to answer your hypothetical question with "no." (Joseph Schuster)

Question:

Frank Gregg said that money is the key, and that if funding in the next few years does not reflect the present legislative mandate for improvement of the Nation's rangeland there will be a question whether effective action can be taken in the future.

I am concerned that in this era of budget cutting, resource enhancement, such as upgrading our rangelands, will take disproportionate cuts, even though in many cases these programs represent Government investment for renewable resource returns for the Nation's future, as opposed to Government spending.

How do the other panel members see the funding future? Do you expect to be managing declining budgets in the future, even though you will be handling what you have called these heavy burdens? What priority will you give rangelands as your budgets are cut? (Priscilla Grew)

Response:

Rangeland and its problems and opportunities are becoming more widely known and appreciated. Certainly, the 881 million acres of rangeland covering one-third of the Nation's land area should be, and must be, recognized for its resources, its past and present contributions, and its potential for meeting future public

management and development, whether public or private—must compete with other programs for funds.

Options for producing the kinds of goods and services that rangeland offers will be closely reviewed by those setting policy and making budget decisions. If it appears that rangeland programs are competitive or have an edge on other programs due to a broad variety of reasons including need for stewardship of the land base, funds should flow into range. On the other hand, if it cannot be shown that rangeland programs are competitive, or that the national good cannot be better served through increased public investments in rangeland programs, increased funds for rangeland programs will not appear.

It is not likely that public agency resource budgets will decrease. However, the relative share of the national budget that flows into rangeland programs probably will be a function of changing national needs and priorities, and it could be greater or less than today's share. The priority which will be given rangelands, should resource budgets be cut, will be closely related to the relative priority of rangeland needs and values, and needs and values of other programs at such a time. (BLM, FS, and SCS)

Question:

Mr. McGuire, you pointed out that additional and peripheral programs have diluted and diverted efforts directed to the chief mission of your agency and others. Can you suggest any ways in which we, who benefit from your services and pay for them as taxpayers, can assist in reducing or removing the legislated and directed obstacles which impede the basic tasks of conservation land management? (John Merrill)

Response:

More and better communication about major issues between the public administrator and the concerned citizen should be a good place to start. Those of us in public administration need to tell you what we are doing; what our goals are; how they are set; how they relate to specific national issues, legislation and other direction; and our opinion as to what effect achievement of these goals, or failure to achieve them, will have upon society. Forums, such as the Rangelands Symposium, are one means for the kind of dialogue essential to achieving good communication; important issues should be surfaced. Greater understanding of the issues should enable more effective communication with legislators and others who are seeking means for achieving the public good. (FS)

Question:

Mr. Davis, I understood you to say that the future of cost-sharing for conservation work is not very bright. The Great Plains Conservation Program has been the most effective cost-sharing tool in assisting landowners in the Plains States to stretch their own dollars in applying a coordinated conservation plan to their lands. A great many qualified potential applicants have not yet

the end of the programs in 1981. Do you consider renewal and extension of the Great Plains Conservation Program to be a high priority for SCS and the farmers and ranchers who look to your agency for conservation assistance? (John Merrill)

Response:

Yes, within SCS we do consider renewal and extension of the Great Plains Conservation Program (GPCP) to be a high priority. We will do everything within our discretion to continue to offer the GPC Program to farmers and ranchers. This will not be easy, considering the austerity mood of the administration and the desire of the Secretary to combine all USDA cost-share programs.

We feel sure that legislation will be introduced in the next session of Congress to extend the GPCP. How it will fare is anyone's guess. I am sure you are aware that the National Cattlemen's Association, the Society for Range Management, NACD, and several other organizations have passed resolutions supporting the continuation of the GPC Program. We appreciate their support and vote of confidence. (SCS)

Question:

I've invested my whole life savings in our ranch, which is predominantly public lands, and I'm concerned about the future.

Many statements have been made lately that the rangelands are in poor condition and that they're not producing up to their potential. I'm sure that there is room for improvement, but they're not in poor condition in comparison to the last 25-50 years and the livestockmen haven't caused the western deserts.

It has been expressed in this symposium that each Allotment Management Plan (AMP) has to be tailor made and I agree with that. But the people we work with on the local level start every plan with a cut, and generally their only consideration is the vegetation, one reason being they know very little about livestock.

Now I'm very concerned about tenure and permit value and whether I can stay in business, and I'd like to share a personal experience with you. I bought out my uncle and we got a new BLM man to work with. For 2 years, he had lots of ideas that really didn't apply, and then he finally got acquainted with the area. I went away to school and when I came back, we had another new BLM man to work with. We went through the same process with him and 2 years later, I went to Mexico for 2 years to serve a mission for my church and when I got back, guess what we had at the ranch? Another new BLM man.

Is this just a training ground for BLM personnel? What is the future of the BLM lands? Would you encourage your own boy to invest his earnings in the public lands? (Robert V. Arlin)

Response:

The BLM has rapidly expanded during the past 10 years due to increased public demands and new legislation. As a result, new positions have been created to accommodate these additional demands and workloads. As additional positions are created, greater advancement opportunities are provided for the BLM employees. There has been a tendency to move employees faster than in the early years of BLM. The Arizona Strip District Office is no different than any other office in this respect. The employees that affect grazing administration in your area, such as the Area Manager and District Manager, are not new to the BLM and have had years of training. They do, however, need to be oriented to situations and conditions that may be new or different to their past experience. This could take several months to a year before they become fully familiar with an area and its problems. BLM procedures and policies are standard throughout the Bureau and are becoming more binding. You may already see this happening.

As for the future of BLM lands, they will be managed under a multiple-use concept that includes grazing. Much of the public lands are suitable for livestock grazing and will continue to provide this use. This has been reinforced with the more recent passage of the Federal Land Policy and Management Act and the Public Rangeland Improvement Act. Both provide for continued grazing use by domestic livestock.

The public lands are of course subject to congressional action that could change present uses such as the imposition of wilderness. Much of the State and private lands have values directly related to public land and its uses. As long as public lands are needed to support local and national economies they will continue to support these uses. When uses change on dependent private land (farmland to residential or recreational land) public land uses will invariably change also. The stability of an area to support the livestock industry will determine whether or not investments in livestock grazing on public land is warranted. This of course can only be determined at the local level through anticipated future economic endeavors or trends. (BLM)

Question:

Is there any other Nation that has a grazing system that may improve our present system? I am interested in one in particular, the Rhodesian calf incubator. (Rogers Pearce)

Response:

We in USDA have a continuing effort underway to assess the merits of grazing management systems in use in other countries and their possible value in improving systems in the United States. Although we are not familiar with the Rhodesian calf incubator, systems to enhance calf gains during early development have been developed (SEA-AD).

**STATEMENTS
and
GENERAL COMMENTS**

The following statements were submitted for inclusion in these proceedings.

Submitted by:

Robert M. Williamson
President, Society for Range Management

The following statement is a response to the opening speeches of this symposium by Dr. M. Rupert Cutler and Mr. Guy R. Martin.

The Society for Range Management is an international professional organization composed of over 5,800 members with a common interest in the study, management, and rational use of rangelands and related ecosystems. We commend and thank you for the concern expressed in initiating this symposium for the purpose of reviewing, renewing, and reemphasizing rangeland policy.

We would like to go on record as having made several observations regarding national policies and implied commitment by Dr. M. Rupert Butler and Mr. Guy R. Martin, key Federal leaders, during this important and historical National Rangelands Policy Symposium.

We feel confident that the implied commitments of Dr. Cutler and Mr. Martin relative to the following policies have significant consequences for our Nation's rangelands.

The statements that follow are set forth as observed by noted scientists, researchers, users, and others interested in the management of rangelands. The following are from Dr. Cutler's remarks:

- (1) A commitment to address rangeland conservation and management needs on a high priority basis—beginning NOW.
- (2) Recognition that although range has been neglected in the past, USDA will now give range equal billing with other resource programs.
- (3) Recognition of neglected range ecosystems and a desire to develop the value and tap the potential productivity of the rangeland resource, both private and public.
- (4) Receptiveness to listen to and accept for consideration our suggestions regarding policies, programs, and practices to achieve objectives in the interest of improved productivity and protection of rangelands.
- (5) Commitment to strengthen rangeland research programs so as to improve our ability to accommodate a blend of rangeland uses.
- (6) The Department's desire to review the opportunities to invest in cooperative extension and technical assistance essential to improved rangeland productivity.
- (7) Commitment to continue to permit livestock grazing and rangeland improvements in National Forest Wilderness Areas.
- (8) Recognition of the vitality of the western livestock industry and subsequent impact of federal range policies on that industry and associated rural communities.

The following refer to Mr. Martin's comments:

- (9) Preparedness to take seriously the new concepts and directives in legislation.
- (10) Preparedness to dramatically improve the quality of BLM's relationship to the range

science community, as part of an overall effort to improve the techniques, data and policies they use.

- (11) Preparedness to give immediate and special attention to the techniques available, both within mitigating the economic effects of needed management actions.
- (12) Preparedness to deal directly with the massive problems of interspersed range ownership by forging new working arrangements with State and private land managers.
- (13) Recognition that environmental and wildlife interests must be willing to accept grazing continuation under proper circumstances, even in areas of special protection.
- (14) Recognition that the Federal managers must now move to make new and basic decisions on the combination of uses which will lead to long-term recovery of the public range.

The Society for Range Management commits itself to support these goals, objectives and policies as implied, and pledges its support to cooperate in their rational implementation.

We encourage our colleagues and representatives of other national and State associations to join us in this effort. Our commitment starts today. Hopefully, your commitment is just beginning.

Statement by:

The National Cattlemen's Association
The Public Lands Council
The National Woolgrowers' Association

The National Cattlemen's Association, the Public Lands Council, and the National Woolgrowers' Association endorse the statement of the Society for Range Management and pledge support of the effort to get on with the improvement of the productivity of the rangelands in a professional, efficient, and cooperative manner.

Statement by:

Neil Sampson
Executive Vice-President, National
Association of Conservation Districts

The National Association of Conservation Districts, representing 3,000 conservation districts across the Nation, concurs in the statement of the Society for Range Management and pledges its support to all agencies, groups, and individuals to put these policies to work to improve rangelands for the benefit of all who use them.

Statement by:

Bruce Prenguber, Economist
Northwest Economic Associates

The importance of the range resource to the well-being of many local communities in the West was confirmed during the Symposium. Lack of useful inventory data was also discussed. The purpose of this comment is to emphasize two ways that rangeland inventories conducted by local communities can be improved. First, the

Darryl Plank pointed out in his symposium summary that consistent definitions by the public agencies are needed. However, the Symposium discussion centered on range condition. It is also extremely important to consistently employ the basic definitions of resource classification. The fact that symposium speakers differed by millions of acres in their estimates of total area of U.S. rangeland suggests that there is either a lack of agreement over the basic definition of rangeland or no reliable national inventory, or both. Undoubtedly, as Dr. Box observed, mixing the concepts of present land use and basic use suitability contribute to the divergent estimates. Since a national inventory is not possible without consistent definitions, a set of basic definitions aimed at measuring long-term use suitability by the public agencies is a necessary first step. The general citizenry and State and local governments would then find inventory data much more useful.

A second way that public land managers can vastly improve the quality of rangeland data for either the State or local government is to provide information by political boundaries. Data presented by BLM grazing allotment areas or USDA Forest Service ranger districts make sense organizationally to these agencies, but do not catch the attention of county commissioners who relate mainly to their own county jurisdiction. Likewise, State government impacts are blurred when agency data are combined for two or more States. Primacy of local land use decisionmaking adds weight to the call for presenting public land data at the county and state level. With recent legislative directives for coordinated resource management and computerized data management capabilities, public agencies should move rapidly to accommodate these valid information requests.

It should be stressed that these recommendations apply to crop and forest land as well as rangeland. Furthermore, as discussed at the Symposium, State-administered public land should be considered along with Federal land in classification and data tabulation. Finally, these recommendations should not be construed as having the effect of locking in public land planning and management at the county or State level, nor oversimplifying difficult and often conflicting decisions on public land use. Actions on data collection along these recommendations might lessen confusion generated by a lack of accurate information. In this way, interested parties could become more knowledgeable participants in public land use decisions.

Statement by:

Donna M. Waters and John C. Stauber
Coordinators, Citizens National Forest
Coalition, Inc.

We appreciate the courtesy and attention with which the other participants in this Symposium on Rangeland Policies for the Future have listened to our suggestions and complaints. We have come to Tucson, like all of you, in a spirit of cooperation and hopefulness that the serious problems that beset our rangelands can be solved to our mutual satisfaction and benefit. We are

paper and red tape and perpetuation of the problems.

We all heard yesterday a very small segment of the controversy that surrounds phenoxy herbicides, a controversy which has been with us since the chemicals were first invented a generation ago. Some people say this, some say that, the scientists agree to disagree, the bureaucracy muddles on, the ranges continue to deteriorate with the value of the dollar, and people continue to be sprayed—often at taxpayer expense—with chemicals that are known to deform fetuses, cause “spontaneous” abortions, and mutate chromosomes in doses so small that our best technology can just barely measure them.

Monitoring studies have shown that some of these chemicals persist in the soil and in streambeds for years. Recent scientific research has proved that they accumulate in the tissue of plants and animals and in mothers’ milk. Other research shows that many of these chemicals break down under natural conditions to form compounds that are often more toxic than the herbicides themselves—and these breakdown products are seldom if ever looked for in people or in the environment.

We are also concerned because no one involved with the dissemination of these toxins seems to be studying or even asking about the health effects these chemicals produce in combination with each other and with other pollutants. What few studies have been done show that at least some of these chemicals combine to become more poisonous than either compound.

The scientists may politely argue with one another forever about how many parts per trillion of which chemical it takes to kill so much of what organism, but the time is past when we can afford to quibble over the fine distinctions of science such as whether or not no-effect levels are even theoretically possible for toxins that bioaccumulate past the toxic level.

We do not know what effect these chemicals are already having, for no medical reporting system is in effect that can give us that information. We do know that phenoxy herbicide residues are already in the food chain, in beef fat, in mothers’ milk, in fish, in shrimp.

Do we really want to wait until some catastrophe before we act? How important is it for us to know whether the gene damage, the cancer, the liver disease, the neurological damage, will come soon or late; whether the probability of lethal poisoning is statistically significant for everyone or for only an unlucky few? How much economic benefit is worth one deformed child or stillbirth or cancerous death? The answer to these questions must be stated in human, not economic terms.

The scientists and the industry and the administrators talk in terms of acceptable risk, but there is no acceptable risk for those of us who are—against our will—being subjected to these highly poisonous chemicals. You may treat your private property as you will. That is one of the basic freedoms guaranteed us by the Constitution. But nothing gives anyone the right to poison another’s person, property, air, or to contaminate public lands and waters and wild animals. You may ex-

some point the public's health must be protected and those animals are marketed.

We have heard much in the last few days of integrated range management and improving range conditions. We concur with you in believing that a broad cooperative effort is necessary to attain and sustain a high productivity on our rangelands, and we are glad to help achieve that goal in any way that is truly constructive in the long run.

Treatment of land and air and water with phenoxy herbicides is not the answer. They are part of the short-sighted cosmetic solutions supplied by the chemical industry and the government such as have long plagued the management of our public lands. Proponents of the chemical habit like to tell us that these poisons are not dangerous if used properly. But we have seen our friends and animals suffer, and have suffered ourselves the ugly realities of phenoxy poisoning. The vested interests tell us that they have seen no documented evidence of abortions, birth defects, and cancer from these chemicals. We cannot say whether these people are lying or if they have somehow missed studies. Certainly some of the studies are hard to obtain. We have taken time to search out these facts and will be glad to share with you the documentation for any statements we have made.

The scientists and government agents do nothing so well as procrastinate. Only private individuals can act quickly enough to stop this foolish mismanagement. We invite you to write us. We ask only that you send a self-addressed, stamped envelope and read the information you receive.

Statement submitted by:

**Bryce Bowman, Secretary-Treasurer
Crow Valley Livestock Co-operative, Inc.
and Executive Board Member
Association of National Grasslands, Inc.**

Concern over areas designated wilderness within the National Grasslands is greater now than ever to myself and other permittees in Grazing Associations such as the Crow Valley Livestock Co-operative, Inc.

With the realization that lands used by individual farmers and ranchers from the time a program was established by the Federal Government, to help agricultural-minded people remain on this land, raise their families, and produce food to help feed the Nation, it is hard to believe this system could be facing a great change.

I am aware that the Forest Service tells us that livestock will be allowed to graze on Grasslands designated Wilderness, where grazing was previously allowed, but there is much doubt and concern to me that without being able to maintain the existing water facilities for the livestock grazing that area, that this could be a very short-term affair.

If I am incorrect on making the statement of not being able to perform maintenance on existing water improvements so as to assure the livestock owner of continued use of the designated Wilderness area, I will

My own ranching operation could be very difficult, and possibly devastating, under the Willow Creek Wilderness Proposal Area 309. At present I depend greatly on a sizable portion of this area to run cattle the seven months that we are off the National Grasslands after each summer grazing season is over. The commensurability rating for my grazing permit with the Forest Service is based on a portion of this Wilderness Area 309 Proposal, plus lands I lease from the State of Colorado directly on the Willow Creek itself.

I do use this State land area to calve out my cows, and without being able to use vehicles to make regular checks on how they are doing, it could well be quite an economic factor.

Some 47 permittees dealing with the Forest Service are involved in this one particular Wilderness Proposal Area. If a cooperative grazing association, such as the Crow Valley Livestock Co-op, should lose grazing privileges on Area 309, a substantial financial problem would surely result.

To end my statement, and to represent all members of the Crow Valley Livestock Co-operative, Inc., I must include here, as I have many times when on the subject of wilderness areas being imposed on these grasslands, that it does seem unlawful and depriving to change the designation of lands that were made available to agricultural-minded people back so many years ago through the Bankhead-Jones Farm Tenant Act.

Statement by:

**Robert Baum, Staff
National Association of Conservation
Districts, Public Lands, Pasture and
Range Committee**

We recommend that the Coordinated Resource Planning Memorandum between the Bureau of Land Management, U.S. Department of the Interior, and the Forest Service and Soil Conservation Service, U.S. Department of Agriculture, signed January 1975 and endorsed by the National Association of Conservation Districts, be fully implemented at the field level.

This cooperative effort has been highly successful in Oregon and in the other States or areas within States where it has been followed. The memorandum established policy and general guidelines for use by the Bureau of Land Management, Forest Service, and Soil Conservation Service for coordination of activities in resource management with Soil and Water Conservation Districts, private landowners, State and local agencies and others in areas of intermingled lands.

Statement submitted by:

**E. T. Bartlett, Chairman, MAB-3
U.S. Man and the Biosphere
Committee on Grazing Lands**

The symposium, "Rangelands Policy for the Future" provided an excellent opportunity to exchange

resources and their uses. The often implied, man's role in the real-world situation was not specifically addressed. The decisions and implementation of plans for range condition, range resource allocation and range improvements will also impact lifestyles of users and beneficiaries of the range. Man as the decisionmaker and recipient of the range management programs is within the scope of interest of the Man and the Biosphere Grazing Land Directorate.

The Man and the Biosphere (MAB) program is primarily one of research and training, designed to develop the scientific basis for land resources management. MAB-3, the Grazing Land Directorate, is one of 14 such committees making up United States participation in the worldwide MAB program set up by the United Nations Educational, Scientific and Cultural Organization (UNESCO).

The MAB-3 Directorate has focused its attention on the production of animal products such as meat, fiber, and hides, but other uses of grazing lands are also considered. The primary objective of this group is to realize the production potential for each grazing area through sustained-yield management systems which are compatible with other human values. The subobjectives are:

1. To study the production capacity of grazing lands, considering site characteristics, management opportunities, and present cultural practices.
2. To assess the animal production potential for each area and, where that potential is not being reached, to assess the kind or kinds of animals needed to reach that potential.
3. To develop methods of technology transfer that will insure that the results of objectives (1) and (2) and other research activities are transferred to the cultures of peoples inhabiting grazing lands. This goal requires that management techniques be compatible with the cultural characteristics of the areas.

This symposium has initiated a realistic discussion of the rangeland and its uses; further efforts must be made to resolve the problems and to implement a successful range program, including research, education, and management. The MAB-3 Directorate is ready to assist in future efforts in any way possible.

Statement by:

**Max Lieurance, Chief
Division of Rangeland Management
Bureau of Land Management**

There is universal agreement that the condition of the rangelands in the West can be dramatically improved. Vegetation production on the public rangelands managed by the Bureau of Land Management can be at least doubled. Without doubt, similar or even greater opportunities also exist on State and privately owned rangelands.

While increase in the production of vegetation on these lands, in terms of forage alone, is vitally impor-

these include:

1. Improve the condition class of over 135 million acres of vegetation now classified as only poor or fair.
2. Substantially reduce soil erosion on 68 million acres now estimated to be in severe, critical, or moderate condition, and stabilize 80 million acres in slight erosion condition.
3. Protect as well as improve the terrestrial habitat for wildlife on 155 million acres.
4. Restore satisfactory conditions and provide protection for at least 6,500 miles of streams.
5. Protect 54 million acres of potential habitat for six endangered animal and fish species presently identified.

By far, the greatest opportunity for improving the condition of the public rangelands lies in the application of intensive grazing management practices. These practices can be designed to bring about the kind of vegetation response that will result in improved condition of these lands.

Intensive grazing management nearly always requires investments in facilitating types of improvements in order to function. A variety of land treatment practices can also be applied as important aids to management. In fact, on certain sites, treatment practices may be required to hasten needed ecological processes. Careful management must always be coupled with these treatments to insure success and prudent investments.

The Public Rangelands Improvement Act of 1978 set the stage for an accelerated program of improvement by authorizing substantial additional funding. This authorization, coupled with other funding authorities of the Bureau of Land Management, presents an opportunity to launch an aggressive program for increasing the multiple-use benefits which can accrue from public rangelands.

There are differing philosophies for managing of public rangelands and private rangelands just as there are differing incentives for investments in improvements. Private lands are commonly managed to maximize a single use, where public lands must be managed for combinations of uses. However, there is an interdependence between lands of different ownerships, particularly where they are intermingled. Close cooperation in planning for management, investments in improvements, and implementation of program will result in more rapid improvement of all rangelands at less total cost than would occur with independent efforts.

The Experimental Stewardship Program provided for in the Public Rangelands Improvement Act will launch a cooperative and coordinated effort to seek innovative ways to provide incentives for permittees and lessees to practice good stewardship. This program will emphasize greater coordination among range users, managers, resource interests, and State and local government in reaching the goal of improving the rangeland resource.

As a matter of policy we should seek ways to blend programs on lands in different ownership and capitalize on their interdependence for mutual benefit. Legal, economic or environmental constraints applicable to

(Editor's Note: Listed below are references to articles about pesticides and their use as presented by Paul E. Merrell, Study Groups Coordinator of the Citizens Against Toxic Herbicides.)

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Yoder, Jr. et al. "Lymphocyte Chromosome Analysis of Agricultural Workers During Extensive Occupational Exposure to Pesticides"; In Mutation Research; 1973. XXI:335.